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BRIEF HISTORICAL NOTES ON THE INTRODUCTION OF ANTIMONY IN THE THERAPEUTICS OF INTERNAL LEISHMANIASIS.

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The history of the most important discoveries, whether in medical or other scientific fields, presents in its initial stages almost invariably some inaccuracies, which are attributable to the natural ambition of man, and once a discovery has been made and its real importance ascertained, a number of individuals at once push forth claims for the so-called "priority" of discovery.

Now, while such a phenomenon could easily arise in ancient times, when means of communication were slow, and in consequence complete ignorance used to prevail in certain scientific centres of what was going on in others, it would seem almost impossible for it to occur nowadays when the exchange of ideas between the remotest centres is so rapid.

It therefore seems very strange that so much confusion should have arisen in latter years with regard to the introduction of antimony in the therapy of internal leishmaniasis after two young Italian scientists, Caronia and Di Cristina, had announced their first success in this field.

In order to avoid erroneous notions being spread in medical literature, which might later on obliterate the true facts, I deem it opportune to expose in these short notes the objective history of the application of this new therapeutic method.

Naturally, I shall base my facts upon the data given by literature with its dry but precise indications of time, not upon simple affirmations supplied by some more or less posthumous author. After the results of research, carried out with patience, tenacity, and audacious trials, are made public, it is very easy for anybody to maintain that he has already previously arrived at the same result; it is easy and also credible if the affirmation comes from a person admittedly competent on the subject. But it is necessary to admit that in this manner the merit of even the greatest observers could easily be compromised, and therefore it is just that no posthumous affirmation should be taken into consideration, no matter from whom it may issue.

With this criterion, I proceed to relate the history of the most important curative application of antimony, and that is, its value in the therapy of internal leishmaniasis, but not without first giving a short account—in order to clear some points—of the use made of antimony in other tropical diseases up to the end of 1914.

Trypanosomiasis.—Antimony was first applied in the experimental trypanosomiasis of mice by Plimmer and Thomson (June, 1907), who obtained good results, using the antimony salts of sodium and potassium. It must be remembered, however, that about one year (i.e., June, 1906) Nicolle and Mesnil, reporting on their attempts to cure human trypanosomiasis with arsenical preparations, had hinted at the possibility of using a preparation of antimony.

The first experiments of Plimmer and Thomson, at an interval of six months from each other (January, 1908), were confirmed by Mesnil and Brimont, and at about the same time (March, 1908) Manson attempted the treatment of two cases of human trypanosomiasis by hypodermic injections; but, owing to the strong local irritation caused by the salts of antimony, the drug was administered by way of the mouth, which, however, afforded indefinite results.

Meanwhile, shortly after (July, 1908) the researches of Broden and Rodhain, giving details of brilliant results obtained from the intravenous use of tartar emetic in various cases of human trypanosomiasis, were published.

The report of these two workers, to whom the merit belongs of having introduced the intravenous use of tartar emetic, was shortly followed (September, 1908) by a series of researches on the chemotherapy of human, experimental, and animal trypanosomiasis, with the result that at the present moment antimony is largely used as one of the most efficacious drugs against the infection of trypanosomiasis.

In the bibliography will be found chronologically set out the literature on the subject up to date, so far as it is known to the writer.

External Leishmaniasis.—In the external leishmaniasis (cutaneous and mucous) of South America, otherwise called *espundia, Barn ulcer, buba,* &c., the first application of tartar emetic intravenously is due to Vianna and Machado, who in 1913 brought forward at a meeting of the Brazilian Dermatological Society cases of ulcerating leishmaniasis completely cured by the new therapeutic method.

During the same and the following year (1914) other confirmations came again from Vianna and other workers: Terra, Da Silva, Carini, Carvalho, Lindeberg (who used trioxide of antimony intermuscularly), Lapa, Rabello, and more recently D'Utra and Silva, Borya and Amoral, Torres, Escomel, Da Matta, and Low (who reported on the successful local application of it in a case of tropical sore from India).

Ulcerating Granuloma.—About the same time an efficacious use of tartar emetic in another tropical disease, the so-called ulcerating granuloma, of South America, was made by Vianna and Aragao, who, during the second half of 1913, in the *Proceedings* of the O. Cruz Institute, reported a number of cases completely cured.

This first report was confirmed by Terra and Rabello, Machado, and more recently by Breinl and Priestley, De Souza, Araujo, Low and Newham.

Internal Leishmaniasis.—As can be gathered from the preceding brief reference to the application of antimony in the therapeutics of certain tropical

diseases up to the end of 1914, noteworthy progress had been brought about, but no attempt had been reported up till then regarding internal leishmaniasis in its dual forms (Mediterranean and Indian) which caused many victims and resisted against all therapeutic treatment.

Various investigators had dedicated themselves to the solution of this very serious problem, and already interesting reports had been published on immune and chemical therapeutics. The chemotherapy, however, had principally made use of arsenic, especially of atoxyl and arsenobenzol.

After having exhausted the series of immunity researches in my school, Di Cristina and Caronia undertook a systematic series of chemotherapeutic researches with the object of experimenting, principally with the heavy metals, their parasite-killing capacity being well known. The successful experiments of Vianna in external leishmaniasis becoming known, and following the analogy existing between the different forms of leishmaniasis, they (Di Cristina and Caronia) continued the research on arsenic, but substituted antimony for arsenic, and in January, 1915, they published their first note, which marks the solution of one of the most serious therapeutic problems. These two workers, surmounting technical difficulties of no light weight in small children, reported eight cases of infantile leishmaniasis cured during the second half of 1914, partly by Caronia in the Pediatric Clinic at Naples under my direction, partly by Di Cristina in the Pediatric Clinic at Palermo. As a result of their researches, they maintained the efficacy of antimony in the therapy of infantile leishmaniasis and advised its use in Indian kala-azar.

In fact, after two months Castellani reported a case of kala-azar cured in Ceylon, without, however, giving any definite details on the treatment carried out by tartar emetic and by means of arsenic taken by the mouth and intravenously. To tell the truth, such a case cannot have the value of a confirmation because of the absence of a definite result, and because of the multiplicity of curative means adopted. But later, in July of the same year, six months after the note of Di Cristina and Caronia, Rogers produced a more convincing confirmation from India. No importance can naturally be attributed to the attempt of this observer to claim for himself the priority in this discovery, and the report of Wenyon[1] on this subject is precise:—

"It is to this observer (Vianna) that the credit of first employing the drug intravenously in leishmaniasis (external) is due, and to Di Cristina and Caronia for using it in kala-azar with success must be given the credit of priority, even though the possibility of employing the drug in kala-azar had previously been in the minds of most people having any knowledge of the disease."

[1] *Trop. Dis. Bull.*, vol. iv, p. 221. 1915. Supplementary report to the first publication of Rogers on the "Antimony Treatment of Kala-azar." See also: Low, "The History of the Use of Intravenous Injections of Tartar Emetic in Tropical Medicine," *Trans. Soc. Trop. Med. and Hyg.*, Dec., 1916.

After the reports of Castellani and Rogers numerous publications have confirmed the first researches of Di Cristina and Caronia, whether in regard to infantile leishmaniasis or in regard to Indian kala-azar, especially on behalf of well-known workers and specialists, such as Muir, Mackie, Rai U. N. Brahmachari Bahadur, Gosch Bahadur, Rogers and Hume, Spagnolio, Jackson, Abate, Longo.

Amongst the many confirmations, by means of which this terrible disease in its various forms can be considered vanquished, those of Caronia himself are particularly noteworthy, because he succeeded by intramuscular treatment in employing successfully certain preparations of antimony which had been already the subject of experiment in the trypanosomiasis of mice by Ulhenhut, Hugel, Multz; besides those of Castellani and Longo, who succeeded in obtaining some results by means of the mouth. Noteworthy are also the interesting researches of Pianese, who on material supplied by my clinic succeeded in demonstrating, both anatomically and pathologically, the specific action of antimony on the leishmaniasis parasites.

Conclusion.

Recapitulating objectively and calmly the literature on the subject proves that the use of antimony, which had been successfully employed in trypanosomiasis by Plimmer and Thomson, in external leishmaniasis by Vianna and Machado, in ulcerating granuloma by Vianna and Aragao, was for the first time used with success in internal leishmaniasis or kala-azar by *Caronia and Di Cristina*.

I close these short notes, hoping that I have omitted nothing which is not in accordance with the truth, and also expressing the hope that new conquests in the realm of research may be gained to enrich the field of therapeutics for the sake of suffering humanity.

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Suprarenals during Acute Infections (V. Goormaghtigh, *Archives Médicales Belges*, August).—The suprarenals under the influence of a general infection, before actual pathologic changes become installed, show macroscopic changes during the course of infectious processes complicating war wounds, more than any other organ in the body. The suprarenals become turgid, the surface grows redder, a bright red or a brownish or sepia red, while the organ increases in weight. From the very incipiency of the infection, the cortex pours out into the blood-stream its reserve of cholesterol and proceeds to secrete more. In grave infections, terminating fatally in two or three days, all the reserves are exhausted. The secretion of new lipoids is activated. With infectious processes running an average of ten or twenty days the suprarenals develop pathologic lesions, the most important of which seems to be the atrophy of the fasciculated zone. The glomerular zone seems to re-enforce or substitute the functioning of this zone. Its task seems to be the collection from the blood of the materials necessary for the production of cholesterol. The other zones show signs of secretory hyperactivity. In infectious processes of slow development the parenchyma of the gland becomes hypertrophied. The data presented apparently demonstrate a close analogy between the mechanism of the secretory processes in the suprarenals, corpora lutea, and the interstitial gland of the ovaries. The epinephrin-secreting medullary substance of the suprarenals is stimulated to enhanced secretion by the infection. The morphologic evidence of this hyperactivity is the pronounced differentiation of its constituent elements. In some cases this excessive activity completely exhausts this portion of the gland. Injection of epinephrin in the course of infections notably augments the activity of the medullary parenchyma of the gland.

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REFLECTIONS UPON THE RECENT APPEARANCE OF MALARIA IN SOME OF THE EASTERN COUNTIES OF ENGLAND.

A good deal is being said at present about the reappearance of malaria in its old haunts in Essex and Suffolk, more especially in places adjoining the seashore. Time was when in the counties of Lincoln, Norfolk, Suffolk, Essex, and Cambridge to the north of the Thames, and in Kent, Surrey, and Sussex to the south of the river, malaria was endemic. For some seventy years it has been in abeyance, and during the past three or four decades it may be said to have disappeared entirely. Lately—that is, during the past twelve months or so—the disease has shown itself again, and its presence is causing much discussion as to the why and wherefore of its reappearance; nay, more, the advent is arousing some criticism concerning the whole theory of malarial infection and the treatment of the disease. The usual interpretation given is the fact that infected soldiers returning from fronts where malaria prevails sufficiently accounts for the outbreak.

This seems simple, and to many a conclusive and satisfactory explanation. Others, however, have called the whole question of infection into the foreground of debate, and complicate thereby what seemed a simple tale. All are agreed that the *Anophelines* are at hand, although in lessened numbers than in days when England was undrained and the swamp-retained pools of still water were available for the mosquito to breed in. "No mosquitoes, no malaria," is the accepted legend; and to this may be prefixed, "No swamps, no Anophelines"; and to it might be added, "No source of infection, no disease." But why is it in the Eastern Counties alone that the disease has appeared (if indeed it be true that it is there only)? In other counties in the south Anophelines are met with, and sources of infection are as plentiful; for men from malaria-stricken areas are not all sent to the eastern districts, nor even in greater proportion than elsewhere. Kent, especially around the Gravesend district, was the last stronghold of endemic malaria in England; and more soldiers and sailors pass through Kent on their way home than any part of England. Yet we hear nothing of malaria spreading in these neighbourhoods; so it is not sufficient to say that these affected districts always were the most malarious in England. Many will say it is natural that the disease should reappear in its old haunts. If, however, drainage is potent in preventing malaria, why the present outbreak? for drainage is as perfect now as it was before the War when no malaria was present; and surely if anything is proved in connection with the disappearance of malaria, it is the fact that drainage (that is, the prevention of swamps with their appropriate pools in which Anophelines may breed) does prevent malaria. We have only to point to the cases of the Panama Canal, Ismailia, and a host of others in which mosquito-spread ailments have disappeared with the destruction of breeding grounds for the mosquitoes; and were we to add the example of malaria disappearance in England itself, perhaps no better example could be furnished.

There seems an alarm that the present outbreak in Essex may cause the disease to become endemic in England again; this is surely an unjustifiable dread. A few years ago we had in Suffolk a sharp local outbreak of plague, a number of people dying

of the disease, which was chiefly of a pneumonic type, and several groups of animals were shown to be infected by plague. Yet neither did plague spread, nor did the district become a centre of endemic plague. If plague can be stayed in its course by appropriate preventive measures, malaria, by destroying the breeding places of Anophelines in the district, can be eradicated. Have the Anophelines increased in numbers recently? Although always present in the fauna of the district, their numbers are comparatively and actually few. If they have increased in number, why have they increased? Seeing that the drainage of the soil is as it was before the outbreak, it is impossible to ascribe the increase to any drainage changes. If increased, have they increased owing to the presence of men infected with malaria? We have yet to know that Anophelines multiply when they find more people suffering from malaria in any district. Is the blood of a man suffering from malaria sweeter to the mosquito or more capable of providing nourishment to their young or to themselves because it contains the malaria parasite? That the blood of man helps the development of the ova of the mosquito we know, hence the acerbity of the female Anophelines in their attacks; but that the blood thus imbibed provides better nourishment for these ova when it is laden with malaria germs we have yet to learn.

Some observers raise the question as to the source of the malaria parasite in nature, and declare that we are working in a narrow groove and devoting too much attention to the mosquito-to-man and the man-to-mosquito problem, leaving untouched the greater question, namely, the source in nature of this deadly germ. Many discount all attempts made to elucidate this mighty problem, and have done much to stifle inquiry in this direction. This statement will no doubt be repudiated. "We do not say it has no such existence, all we say is that it has not been found." Have we tried to do so? is the natural retort; or have we encouraged others in their search? It may safely be maintained that no systematized attempt has been made in this direction, and until it is found we cannot dogmatize.

The tangle of argument might be pursued, and we might be led astray by following the themes brought forward. The simple fact stands forth, surely, plainly enough. Many men have returned to Britain from malarial fronts; in some places malaria has found congenial soil to thrive in, and it has spread in these districts. The congenial soil is the presence of Anophelines, and to that and to nothing else in the present state of our knowledge can we attribute the outbreak. "In the present state of our knowledge," however, rather begs the question; for it is a question whether our knowledge has reached such a stage that we can speak definitely. Until the origin of the malarial parasite is found we can only argue in a circle; the mosquito and man are the two factors necessary to continue the life of the parasite; but the parasite is neither normal to man nor the mosquito; and, that being so, where has it its birth and dwelling place apart from either of these? It may well be asked, what does it matter whether the malarial parasite exists outside the human body and the mosquito or not. All we require we know—no mosquitoes, no malaria—which is quite good enough to go on with; it is of no practical importance where the natural organism resides or how it gets to man or to the mosquito. All we know and all that we require to know is that a human being infected with malaria comes into a district and if there are Anophelines about malaria will spread. A disgraceful argument.

There is no suspicion that the mosquito can be infected first and man afterwards; always it is believed that man is infected first and the mosquito afterwards. It may be so, and it may be positively stated that such is true. The same may be said of any infectious disease. The human infector must be there to infect other human beings; the air, the food, or insects are merely the carrier or the alternative host. There is, of course, the question beyond: how did man become primarily infected? Are we stretching the affairs of Nature to beyond our ken? As soon may we say, Whence comes life? It is not the same, however; we are only following out the biology of a living thing, if we venture beyond the "man to carrier and carrier to man" state of affairs. But *cui bono?* Leave it alone and accept the practical issues we have arrived at and work upon them. That is mere evasion, and puts aside a great scientific problem which has in it visions of scientific attainment with results which are incalculable. The real sources of infection have not yet been taken up by scientists, and even when anyone has made a step in that direction his efforts have been set aside with something like contempt. That it will not be always so is certain, and then, and then only, can science assert herself; in the meantime we are limited, and worst of all we are doing our best to discredit anyone who attempts to go beyond the narrow cycle of "man to carrier and carrier to man."

Why is it that malaria should break out in England now and not at other times? We are accustomed to receive in Britain yearly malaria-infected people; hundreds—nay, thousands, of tropical and semi-tropical residents seek our shores in time of peace, yet they do not spread malaria to the families at home. Yellow fever is known to have infected the families at home when boxes of clothing from dead relatives have been opened in their presence; yet the disease does not spread beyond those who sat around the boxes. The cause is, of course, nowadays well known. It is not the clothing that infects, but the live mosquito escaping from the box, which by its "bite" infected those around the newly opened box. But the mosquito that conveys yellow fever dies on exposure to a climate it is impossible to live in, and so its power to spread the disease is promptly curtailed. Not so with malaria; the Anophelines are always active in England at certain seasons, and yet from the thousands of opportunities they have of becoming infected, and therefore of infecting, they seem

incapable of doing so. Why, therefore, when a few hundred soldiers (if so many) home from malaria-infected countries reach Essex, &c., should the disease spread to the dwellers in the neighbourhood? Is there any difference between the arrival of these soldiers and of the civilians or regiments from the Tropics? At first sight it may seem absurd to say so, but on looking into the matter there is a difference. Infected soldiers leaving Greece and coming to England is quite a different matter from civilians or regiments coming, say, from India, the Malay Peninsula, or even East or West Africa. The voyage is shorter in the former case; from Greece overland to England a week or ten days may suffice for the journey, but a regiment coming from India, China, &c., means a voyage of three weeks to a month or more. The power of infection might be, and probably is, greater the younger the malarial parasite is encountered in the blood. If so the parasites are as yet young in the Greek or Syrian infected man, whereas in a man from Mesopotamia the parasitic infection is perhaps a couple of months old before England is reached. As a direct sidelight on the question, let us ask: How often do malaria-infected residents from the Tropics show parasites in their blood on reaching England? From long-time observations by the writer, not more than 10 per cent. of people home from the Tropics who suffer from attacks of malaria in England, be they intermittent or remittent, show malaria parasites in their blood. The absence of malaria parasites from the blood is no test that that man is free of malaria. Attacks will continue in England for three or four years we know; yet the most careful experts working with all the required technique have failed to find, in the experience of the writer, blood parasites in 90 per cent. of those examined. It would appear, therefore, were this idea correct, that the more recent the infection the greater is the danger of the infected individual to the people in the district at home where malaria-stricken people reside.

Yet another thought. As mentioned above in connection with the infection of yellow fever by mosquitoes carried to England, may the same factor not hold good in the case of malaria? We know from the famous experiment [when Drs. Low and Sambon sent from Italy to the London School of Tropical Medicine mosquitoes which had bitten malaria-infected folk dwelling in the Roman Campagna, and when on arrival at the School two men —the late Dr. Manson, son of St. Patrick; and Mr. Warren, of the London School of Tropical Medicine —were bitten by these mosquitoes, and in due time developed malaria] that mosquitoes can be carried a long distance, and that they convey infection. Had the journey been longer, would these mosquitoes have had the power to convey infection? can only be guessed at, for it has never been demonstrated.

If from Italy, why not from Greece? and if from Greece, why not from Syria? It is a fact that the transmission of these mosquitoes from Italy to London required extreme care in order that they should not die on the journey; yet do the yellow fever mosquitoes survive a journey from the West Indies to Britain, even in sailing ships, and remain capable of infecting people the moment they escape from the box. Is it therefore not possible that the outbreak is due not to the infected men coming from malaria-infected areas, but that the infected mosquitoes carried in their kit or boxes are the present origin of the East of England outbreak?

Malaria differs from yellow fever, for, as in the latter case, the mosquito that carries it dies; the Anophelines are to be found in England in numbers proportionate to the breeding-ground facilities, and as they, with all perfections of drainage, can never be quite eradicated from the low-lying districts of the Eastern Counties, the spread of malaria by imported infected mosquitoes once introduced is possible.

J. C.

Annotations.

Triumphs of Sanitation (*Medical Record*, November 3, 1917).—In 1898, during the Spanish-American War, the American Army had approximately 22,000 cases of typhoid fever with about 2,100 deaths, most of the infections occurring in the United States; in 1916, when a similar number of soldiers were encamped on the Mexican border, there were only forty-six cases of typhoid with one fatality, this single death being the case of an officer in the Medical Reserve Corps who claimed to have had typhoid fever, and consequently did not take the anti-typhoid vaccination.

Likewise, scurvy in the naval forces has been almost exterminated. In 1797, prior to the introduction of anti-scorbutic measures in the British Navy, the death-rate was approximately 120 out of every 1,000 per annum. Fifty years later the rate in the British Navy was 30 per 1,000, and last year in the American Navy the loss was but 4·48 per 1,000 of personnel. This is one of the conspicuous examples of sanitary achievement in the Navy. The provision of cold storage facilities on the ships for preserving fresh vegetables, fruits and meats, the installation of good ventilation, lighting, and plumbing, the establishment of hospitals and the general care of the health and comfort of the mariners has made the American Navy unexcelled in general health standards and sanitation. The healthfulness of the Navy is remarkably good.

Pellagra.—A side-light on the relation of food and disease was based on the study of 2,000 deaths which occurred among the policyholders of the Metropolitan Life Insurance Company in the Southern States. The records were studied with a great deal of care, and covered the period from 1911 to 1916. The year 1915 was a very heavy year for pellagra, which exacted more deaths in the region than scarlet fever. The reason for this high mor-

tality was ascribed to the bad financial condition of 1914 following the opening of the War, with its disastrous effects on the cotton growers of the South. In 1916 the pellagra death-rate uniformly dropped over 50 per cent. It went down to the rate of 1911 in every district. Next year, following the present food shortage, may again show an increase in the incidence of pellagra. It may also be of interest to note that on the basis of the study the death-rate from pellagra was found to be much higher for the negroes than for the white race, it was higher for females than for males, and it was higher for adults than for children. It is very rare as a cause of deaths in infants and children. At the age of fifteen years it begins to appear, and goes up rapidly with advancing years.

Retention of Bile (*Semana Medica*, xxiv, No. 25). G. Segura reports cases to show the difficulty of differentiation in cases of jaundice, and that surgical treatment is imperative when jaundice has lasted for two months at farthest. The laparotomy may reveal a benign curable process when everything seems to indicate malignant disease. The retention of bile injures the liver and is liable to induce a hæmorrhagic diathesis. This proved fatal in two of the cases reported in which the operation came too late, the whole trouble being merely from an echinococcus cyst in the liver. In another case the liver opened into the bile passages, and there was transient obstruction at intervals, probably from expulsion of daughter cysts. As these were finally passed along, the obstruction was only temporary and there was no tendency to hæmorrhage. Even when the laparotomy discloses malignant disease, gastro-enterostomy may permit long survival, as the retention of bile otherwise is liable to prove fatal before the patient succumbs to the cachexia. A man, aged 23, had primary cancer of the biliary passages, inoperable when first seen, with no history or trace of gallstones. Necropsy in the case of a man, aged 58, showed cancer developed in a duodenal ulcer. The ulcer symptoms had been unmistakable for two or three months, and then jaundice developed within a few days, evidently from invasion of the bile duct by the carcinoma. In another case a hard drinker developed suddenly pain in the liver, and jaundice, but in the course of six weeks of rest and careful dieting the jaundice had almost disappeared, and the man, aged 60, had gained several pounds in weight. Catarrhal jaundice was the diagnosis, but the jaundice grew more intense by the end of three weeks, with subcutaneous extravasations of blood and ascites. Necropsy revealed a primary nodular cancer in the liver. In a case of Hanot's cirrhosis of the liver there was no jaundice or fever for a year and a half, but then jaundice gradually developed with intense pruritis and a loss of over 40 lb. in weight. The stools were absolutely clay coloured, and a passage for the bile was made by joining the gall-bladder and duodenum. The patient succumbed to pneumonia not long after. Another man, aged 33, with drinking habits had long had frequent digestive disturbances, ascribed to the stomach, when a very severe attack of indigestion followed eating five melons. The bowels did not move, even under repeated doses of castor oil, and the fifteenth day jaundice developed. The liver could be palpated at the fifth rib, but it was not tender through the interspaces; the lower margin was slightly tender. He improved in the hospital, gaining over 11 lb. in weight in two months and returned to work, but the liver increased in size and ascites required tapping. The diagnosis wavered between four different liver diseases after the assumption of catarrhal jaundice had been dropped, but necropsy, eighteen months after the first sign of jaundice, disclosed cancer of the ampulla of Vater.

Chronic Suprarenal Insufficiency after Epidemic Jaundice (*Rivista Critica di Clinica Medica*, August 4-18).—G. A. Notari describes six new cases of this type. The pigmentation resembled that of Addison's disease, and the weakness was extreme; in one case there were two periods of acute suprarenal insufficiency. The exaggerated oculocardiac reflex and the organic reactions to atropin and pilocarpin show that in these cases the sympathetic hypotony seems to be compensated for by the autonomic system. It seems to be evident that next to the liver and kidneys the suprarenals suffer most from the spirochæte infection. The spirochætes accumulate in them in enormous numbers. In the cases described the blood-pressure was not abnormally low or but very little below normal, and epinephrin depressed instead of raising it or did not modify it at all, or only slightly. There was no epinephrin glycosuria. The data reviewed confirm the theory that besides the direct action of the spirochætes on the suprarenals, they suffer additionally, indirectly, from the alterations observed at necropsy and in such cases in the solar plexus.

Heat Stroke (H. Gauss and K. A. Mayer, *American Journal of Medical Sciences*, October, 1917).—All patients with a temperature of 103° F. or over were immediately placed in a tub of tap water, the level of which was just high enough to cover the body except the head, which was supported in a hammock packed with ice. Vigorous friction was applied to the entire body by four or more persons; ice was freely added to the water, the friction being constantly maintained; the temperature was taken rectally every minute. When the temperature reached 102° F. the patient was removed from the bath, wrapped in sheets or blankets, and returned to the ward. Generally 102° F. was reached in ten to thirty minutes. When the patients were returned to the wards their temperature usually continued to fall, frequently reaching subnormal—95° to 97° F. Cardiac stimulants were given freely, strychnine, sodium caffeine benzoate, digitalis, strophanthus; an ice-bag was placed at the head, and chipped ice was given by the mouth. For subnormal temperature external

heat was applied. For recurrences in temperatures up to 103° F. cold packs and alcohol sponges were given; above 103° F. the patient was again given a cold water friction bath. It was observed that recurrent temperatures could not be reduced as easily as the initial high temperature, and in a few instances the temperature continued to rise in spite of prolonged friction in cold water. For restlessness and convulsions sedatives were used; morphine, chloral hydrate, scopolamine, the bromides and mechanical restraints.

Epinephrin in Addison's Disease (P. Nolf and H. Fredericq, *Archives Médicales Belges*, August). The case of Addison's disease described is exceptional in the extreme tolerance of the patient for epinephrin. The man of 38 with grave symptoms of suprarenal insufficiency was given 10·5 mg. epinephrin in four and a half hours; this included 2 mg. subcutaneously and 8·5 mg. intravenously. No sugar appeared in the urine, and the blood-pressure was not brought up quite to the normal figure even with this. The following days 6 and 4 mg. were given. There were no signs of intolerance at any time, even though to attain the desired therapeutic result these large doses were found necessary. The case teaches that we need not shrink from large doses of epinephrin in emergencies, as with acute suprarenal insufficiency under chloroform, or with gaseous gangrene or other hypotony of infectious origin. By watching over the blood-pressure as the epinephrin is being taken, we can continue it and push it until the arterial pressure is brought up to a point where the functioning of the organs is possible once more.

Mammitis in Soldiers with Malaria.—C. Garin (*Lyon Médical*, September) found mammitis in five of 800 soldiers under treatment for malaria, and five other cases have recently been reported by others. The mammitis caused no trouble for several months, but as suppuration developed there was considerable pain. In two of the men the other mamma suppurated a month or two after the first. In one case there was secretion of colostrum in the course of suppurating mammitis.

Sodium Arsenate in Treatment of Soft Chancres.—Goubeau (*Bulletin de l'Académie de Médecine*, September 4) treats soft chancre and chancrellous bubo with sodium arsenate in a 2 per cent. alcohol (95 per cent.) suspension. The soft chancre is painted daily, and if there is a complicating bubo 1 or 2 c.c. of a 1 per cent. aqueous solution of the sodium arsenate injected into it (repeating on alternate days. The average course of treatment was shortened to nineteen days in 149 cases of chancre without bubo, the cure being complete in from four to ten days in the early cases. The most instructive case was that of a negro from Africa who had had vast soft chancres for over six months, rebellious to arsenobenzol and mercury. Five applications of the sodium arsenate suspension transformed the angry lesions and repair proceeded rapidly, with a complete cure in a month.

Anthrax Bacillus Meningitis (Rijuberk, *Nederlandsch Tijdscrift voor Geneeskunde*, September).—At the necropsy of the young soldier who had succumbed to fulminating hæmorrhagic meningitis, the anthrax bacillus was found in the meninges and spinal fluid and in internal organs. He had helped to slaughter a cow with anthrax not long before. The intense cyanosis, early unconsciousness, and speedy death were special features of the case. The first symptoms, pain in right arm and shoulder, were noticed ten days after the slaughtering of the cow, and a pustule on the arm and the meningeal symptoms developed the fourteenth, with death the fifteenth day.

Tertiary Manifestations of Syphilis in the Liver.—Furno (*Policlinico*, Med. Sec., August 1, 1917) reports and discusses in detail five cases of syphilitic disease of the liver, comparing them with similar cases in the literature. All the five cases had a positive Wassermann.

The first case was that of a man, aged 45, who had contracted syphilis several years previous and had been treated for a short time only. For the last three years he had noticed increasing weakness, progressive loss of weight, polyuria, polydypsia, moderate polyphagia, sugar in the urine amounting to 30 to 40 grm. daily, which did not disappear under strict diabetic diet. The enlarged liver and persisting glycosuria subsided under specific treatment, the liver returning to normal size. After the first two injections of calomel in the course of two weeks the sugar disappeared from the urine. There was nothing to indicate disease of the pancreas or a nervous origin for the glycosuria. Furno considers this a typical case of syphilitic diabetes of liver origin. He has found only one similar case in the literature.

The other four cases are of interest on account of the fever. The temperature rose each time that salvarsan was given intravenously or mercury given by inunction. Furno thinks that the rise in temperature is due to the action of the drug on the disease, and is not merely a febrile reaction. The temperature and other symptoms grew worse under mercurials and iodide by mouth in three of the cases. The treatment was persisted in, and improvement took place with the disappearance of the fever.

In all the cases specific treatment brought about a diminution in the size of the enlarged liver, always accompanied by fever. He thinks that this is instructive, showing that the fever is actually the work of the syphilitic process and the process is really subacute. The behaviour of the fever in these cases indicates that the heat regulating centres are irritated by the toxic products elaborated in syphilitic liver tissue rather than that the fever is due to the absorption of necrotic products of the gumma.

One case had a typical attack of cholelithiasis followed by jaundice and fever. At first it was thought to be cholelithiasis, as the pain subsided only after an injection of morphia. Further investigation revealed the true nature of the disease.

Following the specific treatment either with salvarsan or mercury the pain in the liver region increased; coincidently with the increased pain there was vomiting. Only slight jaundice was noted in four of the cases.

There was marked leucopænia in all the cases.

Gastric Cancer simulating Malaria (C. Rovsing, *Hospitalstidende*, September 5).—In the two cases described there were long paroxysms of fever, accompanied by vomiting once each time, but with no other indications of digestive trouble. The first patient was a sailor, aged 47, who began four years before to have attacks of fever, running up to 102° or 104° F. Then he vomited and the fever subsided. These attacks returned every third day for a time. Later the intervals became much longer and irregular. After two years of freedom they returned at three or four day intervals. There were never any signs of jaundice, and the bowel functioning seemed to be always regular. During the febrile periods he complained sometimes of pains in the lumbar regions and spine, but there was never hæmaturia or sand in the urine. The febrile attacks had been ascribed in turn to malaria, septicæmia, pyelitis, and cystitis, but finally, by exclusion, attention was focused on the stomach, although no tumour could be felt. The functional tests and röntgenoscopy revealed stenosis of the pylorus from cancer.

The other patient was a man of 49 who began to have chills, followed by fever running up to 104° F., occasionally accompanied by vomiting. These febrile attacks returned every third or fourth day, but sometimes the fever kept up for four or five days at a time. He was treated with quinine and arsenic for malaria without results, and no parasites were found in the blood. By the fourth month he began to have a sensation of oppression in the epigastrium, nausea and vomiting after meals, with occult blood in the stools. The man was restored to clinical health by resection plus gastroenterostomy, and he survived for over three years before death from recurrence of the adenocarcinoma. At the first operation it was found to have involved both stomach and duodenum and some lymph glands, and it pressed against the pancreas. Rovsing has found five similar malaria-like cases of gastric cancer on record. One (Halla) was a necropsy surprise after ineffectual quinine treatment of "four day fever." In one of Humpeln's three cases the patient was dismissed from the hospital as the "malaria" had proved refractory to a course of quinine treatment, but the man returned three months later with a large tumour in the epigastrium. Necropsy confirmed the cancer, but the metastases could be discovered. In his other cases the cancer was evident along with the malaria-suggesting symptoms.

The lack of symptoms of dyspepsia in the early stages in these cases is misleading. In Bühring's case (1889), there were no symptoms except those suggesting malaria to the very end; necropsy disclosed an ulcerating carcinoma and abscess in the frontal lobe. This was the only one of all the cases mentioned in which there was anything to suggest pyæmia. If the fever is due to absorption of a toxin produced by the cancer, one would expect to find it continuous. More probably the toxic products generated in the stomach from the retention by the closed pylorus caused the fever when they reached a certain level. The vomiting cleared out the stomach, and there was no more trouble until this level had been reached again in the course of three or four days. This assumption is corroborated by the fact that Rovsing's first patient had one or two of the febrile attacks while convalescing from the operation, each yielding immediately to lavage of the stomach. The fever is thus not a contra-indication for operative measures, as the cancer itself is not directly responsible for it. The prognosis of these cases is comparatively good, as is evidenced by Rovsing's first case. There had been symptoms for four years, and the man has been in fine health to date since removal of the adeno-carcinoma in June, 1916. It was a papillomatous tumour displaying little tendency to grow down into the depths, and was sharply circumscribed, although spreading over the lesser curvature, mostly on the rear wall and pylorus.

Idiopathic Dilatation of the Rectum (L. Bard, *Archives des Maladies de l'Appareil digestif*, June). Congenital dilatation of the bladder, colon, and rectum has been a special field of Bard's research. He here describes cases of megarectum in which there was abnormal frequency of bowel movements. In one case, in a man of 48, the rectum filled the entire small pelvis, extending up to the diaphragm. Except for a tendency to constipation, there had been no trouble from megarectum, which was a necropsy surprise, the nature of the tumour not being suspected. The man of 45 had had for years six or seven daily soft stools. When he had to defecate twice in the night he called it an attack of diarrhœa, but no medication modified it, and there were no symptoms outside of the abnormally frequent soft stools. The rectum was much dilated, but not so much as in the first case in which constipation dominated the clinical picture. In two other cases of megarectum with the diarrhœic tendency there was also megacolon, so that diarrhœa with megacolon should not be ascribed to colitis until megarectum has been excluded. In fact, the diarrhœa from the megarectum may mask the constipation from the megacolon. This may lead to serious mistakes in diagnosis, as in still another case in which various tedious courses of treatment had been futilely applied by different specialists to

cure the assumed chronic colitis. This patient was a man of 60, not at all neuropathic, and in good general condition, but annoyed at having four or five passages of the bowels during the night, with two during the day. Röntgenoscopy showed the rectum abnormally dilated and long, and the colon also. In these cases of megarectum, medication to cure the diarrhœa had no effect, as it did not remove the cause, but great benefit followed lavage of the rectum, rinsing it clean, and thus putting an end to the incomplete spontaneous evacuation which was the cause of the frequent defecation. With megabladder, in the same way, there is only fragmented evacuation at a time, and hence the pollakiuria with megabladder is exactly analogous to the pollakicoprosis with megarectum.

Typhoid Meningitis (S. Bonnamour, *Lyon Médical*, September).—The young woman had a typical typhoid fever except for intense headache, and typhoid bacilli were found in the lumbar puncture fluid. Seventeen authentic cases of purulent typhoid meningitis with bacilli in the spinal fluid, and one with paratyphoid bacilli are referred to.

The Reform in the Italian Army Ration (F. Rho, *Annali d'Igiene*, August).—When the War started every effort was made to give the soldiers the best food possible, and the ration was based on the estimate of the calorie needs. It was soon found that what may be proper for a people of heavy eaters did not suit at all the Italian soldiers, coming from rural homes where meat is not on the everyday menu. Pessimistic sociologists have said that the Italian populace is inadequately nourished from a lack of nitrogenous substances in their diet, and they have cited this as an argument to demonstrate and explain the alleged inferiority of the Latin race. But Southern Italy has furnished emigrant labour to the world that can stand comparison with any for the ability to stand fatigue, although bread, vegetables, and cereals is the principal diet. Carbohydrates form the main articles of diet in rural populations nearly everywhere, from the oatmeal of the Scotch to the potatoes of the Irish and the rice of Asia. Folena's experiments on himself (1912) showed that he could maintain his nitrogen balance with a nitrogen minimum of 28·9 grm. He asserts that it is possible to keep at the normal physical and mental level with a protein intake of only 0·6 grm. daily per kilogram of body weight. The unfavourable experiences with the excessive meat ration given the Italian soldiers all tended to show the necessity for reform in the soldiers' ration. A commission of military or militarized hygienists and physiologists was appointed to study the subject. Their report was accepted and acted on, with the saving of 30,000 head of cattle each month, as only 60,000 had to be slaughtered instead of the 90,000 called for by the previous ration. The number of calories provided in the new ration does not surpass 3,000—except in winter and for the troops in the mountains—but even this is more than Chittenden regarded as necessary. All the reports from the army and navy are favourable for the new ration during the six months it has been in operation.

The Soldiers' Ration in the Italian Army (S. Baglioni, *Annali d'Igiene*, August).—There is a great difference between conditions in this War and in previous wars when men lived in open camps. There is no longer the necessity for long marches and physical encounters and effort. The men crouch in shelters and get comparatively little exercise, while their nerves are being constantly on the strain. The ration possibly called for in other wars is not needed in this, and does actual harm. Another difference between this and previous wars is that the food cannot always be served directly when cooked, but has to be carried long distances to the men in the shelters. The food undergoes various changes during this transportation, in addition to its getting cold, so that it loses in palatibility. Among the first steps taken to improve on the former ration was the training of large numbers of men to serve as cooks for the special conditions of the present warfare. The meat ration was reduced from 375 to 250 grm. with optional fish or canned meat two days in the week, and 100 grm. cheese instead of meat on Fridays, with a corresponding increase in rice or pastes (macaroni, &c.). Provision was also made for cabbage and other vegetables, and 40 grm. of cheese every day. The ration includes also 15 grm. of lard or oil on the three beef days, and 20 grm. on the four days of vegetables. Another form of condiment, he says, which is almost indispensable for Italians is the tomato, and provision is made for 15 grm. daily of the fresh or canned tomatoes, or the extract representing 30 per cent. of the dry residue. Variety is also ensured by 10 grm. of onions, garlic, &c.; pepper and spices, 0·5 grm.; salt, 20 grm.; and on the days when one meal consists of pastes, 10 grm. of grated cheese are allowed for it. For cooking soups and pottage, portable cookers have been found extremely convenient for the men on the firing line, and they are being used more and more extensively in the civilian population. But they cannot be used for preparation of the concentrated tomato extract, boiling the onions, &c. On this account the military authorities and certain firms put up in cans a mixture of meat, vegetables, and tomato juice. The inside of the can is varnished to protect the food against corrosion of the metal. The mixture of fats and proteins in the can is varied by different makers and at different times to avoid monotony. The ration of this is 25 grm., which gives a relish to the macaroni or rice served with it. By the change in the ration thus provided, beef cattle and grain are saved in large proportions, while the cheese, tomatoes, potatoes, &c., are domestic products. Camp jaundice rapidly subsided on addition of vegetables to the diet of the men in the

advanced posts, as also certain forms of scurvy and nephritis. The expense of the total ration, including meat, bread, potatoes, vegetables, cheese, sugar and coffee, averages about 80 cents less per week than the old ration; it averages 2,794 calories to the former 3,013. This ration applies only to the territorial troops—that is, those not at the front firing line.

The Navy Ration.—C. M. Belli (*Annali d'Igiene*, August) gives the details for the navy, saying that the calories total 3,036. This includes 170 calories from the wine provided the men. It was proposed to credit the men not taking wine with the money it would cost, but the proposal met with administrative objections. The details of the navy ration are left in large measure to the discretion of the commanders of the vessels to permit variety.

Abstracts.

EXAMINATION OF THE URINE IN CASES OF RELAPSING FEVER OCCURRING IN MACEDONIA.[1]

By S. Dudgeon.

If infection can spread by the urine, as is quite probable, then every possible care should be adopted to avoid carrying urine about in such a manner that a fair proportion is upset over the individual who is transporting it.

The Examination of the Urine.

The urine was centrifugalized at high speed in an electric centrifuge.

The clear urine was examined for albumin, and the deposit was made use of as follows: Film preparations were made on glass sides, dried at 37° C., fixed in formalin vapour for one hour, and redried at 37° C. The films were then treated by the Levaditi method for the staining of spirochæte in the tissues and then examined in the usual way. Other film preparations were dried at 37° C., fixed in alcohol, and then stained for twenty hours by Giemsa's method, but this was not found to be as satisfactory, as the spirochætæ were very difficult to find owing to the presence in the deposit of numerous casts and cells, which obscured the fields of vision. Hanging-drop preparations were made and examined with dark-ground illumination, but owing to the presence of innumerable filaments which are liable to give rise to error, and also to the bulky deposit which is present so often in these samples of urine, little reliance could be placed on this method of examination. The pyridin method was employed, but staining with nitrate of silver, as in the Levaditi process, was found to give the best results. The remainder of the urinary deposit was examined in the fresh state for casts and cells.

The Presence of Albumin.—In the majority of the cases albumin was present, from a trace to a very obvious amount, but in some instances it could not be detected by the picric-acid or boiling test, although casts were found; usually, however, in such cases albumin was demonstrated at a later period of the disease. Once convalescence was established the urine gradually returned to the normal.

Deposit in the Urine.—Every specimen of urine was centrifugalized at high speed and the deposit examined in the fresh state. Casts were usually found, especially hyaline and granular, which were often present in the deposit in very large numbers; epithelial and leucocytal casts were common, but red cell casts were comparatively uncommon. In addition to the presence of casts in the urine, red cells and leucocytes were very numerous on many occasions and also epithelial cells from the urinary tract. Uric acid crystals were abundant but generally subsequent to the acute stages or to the period of active treatment with one of the arsenical preparations.

Numerous observations were made on the condition of the urine before and after treatment with kharsivan. At the infections hospital it is customary to give 0·25 grm. of this drug intravenously as soon as the disease is diagnosed, and in many instances distinct improvement in the condition of the urine occurred, usually gradually, but occasionally rapidly. It is important to remember that a heavy trace of albumin and numerous casts in the urine do not contra-indicate the employment of kharsivan intravenously, otherwise such treatment could not have been employed in this series of cases. Further improvement in the condition of the urine occurred after the injection of the drug and was maintained, and it was not uncommonly noticed that the albumin and casts diminished as soon as the kharsivan had had sufficient time to produce its effect.

In the case of an officer who contracted this disease, but who was considered to be suffering from malaria on clinical evidence, the result of the examination of the urine suggested relapsing fever before the blood was examined.

In no less than five instances spirochætæ were found in the urine before they were demonstrated in the blood.

Bile pigment was absent from the urine in every case, and true jaundice was not noted.

[1] Abstracted from the *Lancet*, December 1, 1917.

PITUITARY FUNCTIONS.[1]

The administration of thyroid-parathyroid products can produce results in certain abnormal conditions of the organism, such as cretinism, that

[1] Abstracted from *Journ. Amer. Med. Assoc.*, November 17, 1917.

lead to definite convictions regarding at least some of the functions of the thyroid apparatus. However, it must be admitted that the evidence regarding even the vague details of precisely what the thyroid extract therapy accomplishes in such instances is at present nothing more than a matter of conjecture. The study of the suprarenals seems to have been more successful from the standpoint of studying the potency of its constituents and its secretion into the blood. Epinephrin has established a place in physiology, pharmacology, and therapy. The ablation of the suprarenal glands which produce it is followed by death. Nevertheless, the recent investigations awaken considerable doubt as to whether epinephrin itself is essential for the continuance of life.

The indispensability of the parathyroid, pancreas, or suprarenals, in contrast with the spleen or salivary glands, has been demonstrated. By extirpation experiments much light has also been thrown on the relation of the sex glands to the development of secondary sexual characters. Yet the apparent negative results of many ablation experiments, as found in the study of the thyroid proper and the thymus, for example, tend to awaken the belief that compensatory functioning in other parts may often obscure the real contribution of specific glands to the body's physiology after their extirpation or some damage to them.

Although no single method of study has been entirely satisfactory in elucidating the complete story of glandular function, the operative removal of isolated structures has thrown a flood of light into many obscure places in physiology. Pathological anatomy, the outcome of Nature's experiments in disease, has often supplemented the extirpation experiment or pointed the way to its meaning. All of this is brilliantly exemplified in the modern study of the pituitary body. Although some of the details of the results of experimental interference have been in dispute, the major features are at length confirmed. Following the lead of Paulesco, Professor of Physiology at Bucharest, who introduced the most successful method of accomplishing experimental surgical interference with the pituitary body, other workers should help to complete the story in some of its most important aspects.

Before referring to the results of this, it may be well to remind the reader that the pituitary body consists of two clearly differentiated parts which have separate modes of origin. The anterior lobe is distinctly glandular in character; the posterior lobe is developed from the nervous tissue with which it is more directly connected. There is no longer any doubt that complete loss of the pituitary body is speedily followed by death which cannot be attributed to mere shock; it is therefore an organ that is essential to life. All the investigators are now further agreed that neither partial nor complete removal of the posterior lobe causes any symptoms. The genital organs, the development of which seemed to be correlated in some way with the integrity of the pituitary, remain normal after ablation of the pars posterior, and young animals continue to develop after such an operation. Hence the secretion of the pars nervosa is neither beneficial nor essential to life. Partial removal of both anterior and posterior lobes likewise causes no symptoms, provided only a small portion of the pars anterior be removed. On the other hand, the removal of very large portions of the pars anterior is incompatible with life. It is convincingly demonstrated now that it is the loss of this portion of the organ that proves fatal when total extirpation of the pituitary is practised.

When the anterior lobe is partially removed in young animals a condition of persistent infantilism with absence of sexual development is likely to occur. Genital atrophy is likewise noted under such conditions. The manifestations of dystrophia adiposo-genitalis, described in animals after interference with the anterior lobe, could be produced in only one way, namely, by interference with or separation of the infundibular stalk. This apparently brings about a disturbance of the blood supply to the gland. As a result there is an insufficiency of the anterior lobe. The cells of this part become shrunken, atrophic, and discrete—a state of affairs which is always found in the human subject afflicted with the syndrome of dystrophia adiposo-genitalis.

It has been held by histologic students of the pituitary that a secretion from the posterior lobe which is in close juxtaposition to the nervous tissues passes directly into the third ventricle. But the only real secretory cells of the posterior lobe—the cells of the pars intermedia—are derived from the same source as those of the pars anterior. Removal of the posterior pars proper does not remove true secretory cells. Separation of the stalk interferes with the blood supply of all these cells. It is henceforth necessary to look on the functions of the pituitary as a whole, and to consider this structure as one organ and not two. The fortuitous juxtaposition of the epithelial cells and the pars nervosa has probably no relation to the vital functions with which the pituitary is concerned. Even if secretion from the pars nervosa does pass into the cerebrospinal fluid, as has been asserted, there is not the slightest evidence to show that this is essential, beneficial, or even the normal method by which the internal secretion is taken up by the animal economy. The blood-stream is the real path for the distribution of the pituitary hormone.

Tumours in the neighbourhood of the sella turcica may be imitated experimentally by the introduction of inert immobile masses. When they produce irritation, glycosuria and emaciation may result, as in the human subject. When the tumours interfere with the blood supply so as to initiate degenerative changes in the cells of the anterior lobe, they may give rise to the syndrome dystrophia adiposo-genitalis. These facts now experimentally established represent a great step in advance in the elucidation of the obscure functions of a very small yet highly significant portion of tissue.

Original Communications.

THE SYMPTOMATOLOGY AND TREATMENT OF HUMAN TRYPANOSOMIASIS IN THE LUSANGA AREA, DISTRICT DUKWANGO, BELGIAN CONGO.

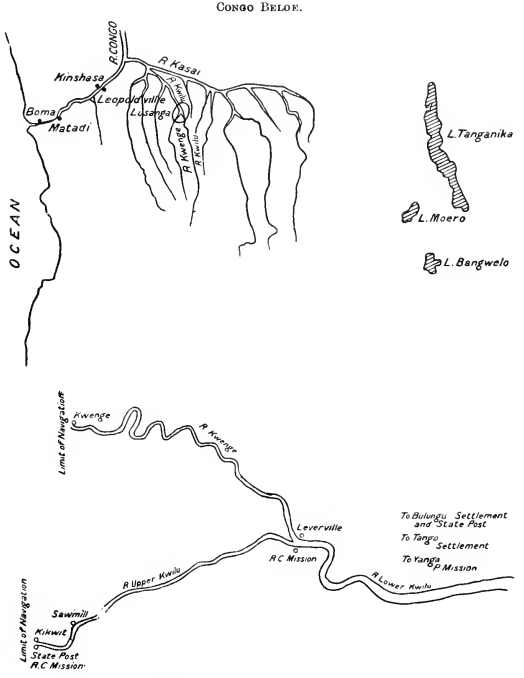
A Report based upon 370 Recorded Cases and 6,200 Intravenous and Intramuscular Injections.

By W. E. Masters, M.D.Brux., L.R.C.P.Lond.

Introductory Remarks.

The writer confines himself largely to human trypanosomiasis as he has found it in the above area during the years 1915, 1916 and 1917. The district in which the experiments were carried out comprised about 4,800 square miles, having as its centre a settlement known as Leverville (lat. 4° 49′ 3½″, long. 18° 46′ 33″), situated about 1,450 ft. above the sea-level, and about 375 miles (600 kilometres) from Kinshasa along the river route.

The area is drained by the two rivers, R. Kwenge and the R. Kwilu, the former forming a junction with the latter, at which junction the settlement of Leverville is situated. The area radiates about 60 miles in all directions from this centre. These two rivers form a large Y, and receive in their turn the usual small tropical streams. The R. Kwilu flows into the R. Congo through the short R. Kwango, and thus gains the sea. At the extremities of the Y are other European settlements, along the river banks are the outlets for agricultural posts, while the natives live more in the interior.



Europeans are scattered over this area, usually close to the river.

The rainfall averages about 60·77 in. per annum (average over three years), and has marked local variations. The average temperature in the shade is 25·20° C. (77·30° F.). There are no mountains, but the undulations of the land are many and marked. The district is not well wooded, but palms (*Elæis guineensis*) abound. The soil is sandy and permits of ready percolation of rain water, which drains itself through the subsoil to the rivers or lies in "pockets," forming marshes in the interior or at intervals along the river banks.

The European population fluctuates, but averages about 100. No census of the native population has ever been taken, but it is presumed to be from 100,000 to 200,000 souls.

The people are pacific in disposition, sedentary in habits, weak in physique, averse to work, particularly improvident, underfed, unhealthy, dirty, and devoid of any native industry worth the name. They live in small communities under chiefs, who have very little or no power or influence over the people. They are content to dwell in grass houses, and to plant just enough produce to assist the bush products in keeping body and soul together and to provide "malufu," native wine, for their dances. Sleeping sickness carries them off one by one until the village has been "wiped out," the houses fall into decay, the bush rapidly overgrows the site, and travellers are only notified of its former existence by the broken pots on the numerous mounds of earth. Villages of 5,000 inhabitants are very rare, and 50 per cent. of these people have been found infected with trypanosomiasis. Small villages of twelve to twenty huts are the rule. I have seen chiefs upon whom the disease has laid its hand, with no people to rule except a handful of skeleton wives.

Amongst the young, apparently healthy male adults, 72 per cent. were found to be infected with trypanosomes by glandular palpation (3,000 examined). Of those patients admitted to hospital for diseases other than trypanosomiasis, 74·8 per cent. were found to be infected upon the first examination of fresh blood, hence the microscopical examination suggests that the percentage assumed to be infected by glandular palpation was too low. Other causes of glandular enlargement here are rare. Some have enlarged lymphatic glands after the disease has disappeared, which glands then become fibriotic, but the writer has found trypanosomes in the fresh blood many times where there was no enlargement whatever of the lymphatic glands; hence in the writer's opinion glandular palpation always gives results under the actual percentage of infected.

Some villages have been reported to me as being free from the disease, and labourers have been recruited therefrom and brought into known infected districts. Such recruits were examined at once, and nearly all of them were found to be infected, some of them dying from the disease in a few weeks.

Upon another occasion a group of labourers was recruited from the Kasai, who were given passports as being free from the disease, but 23 per cent. of these were found infected, some of whom have since died from the disease. From this one feels that the disease is much more widely spread than is believed by various local authorities.

The mortality from trypanosomiasis, as far as we have been able to ascertain from deaths taking place at and around Leverville, is 74·3 per cent., the remainder being from all other diseases.

One can see from this that there is ample clinical material for investigation with regard to the disease. Take the lowest assumed estimate of the population, viz., 100,000, and the lowest estimate of infection, viz., 60 per cent., and we have 60,000 people in this small area alone who are infected by the disease.

Although the remarks in this paper are confined, in the main, to this district, there is not the slightest doubt that the facts therein will be found applicable to other parts of Central Africa.

The causative organism is *Trypanosome gambiense* as far as we have been able to ascertain.

The Glossinæ found up to the present are:—

G. palpalis var. *fuscipes* (Neust), *G. tabaniformis*, West (*fusciplcuris*, Aust?).

The following Tabanidæ have also been found:—

T. maculatissimus, *T. brumpti*, *T. billingtoni* (Newstead), *T. casun* (Karsch), *T. rificrus*, P. de B.

The Tabanidæ are now credited with mechanically transmitting trypanosomes among animals by direct inoculation.

Symptomatology in Europeans.

While natives are dealt with chiefly in this paper, a number of Europeans have become infected in this area, sufficient in number to justify the writer in declaring that the symptomatology in whites and blacks is not by any means identical. Of the many thousands of infected blacks that have passed through my hands, I have never yet seen any of the following symptoms which have been commonly seen in whites:—

(1) Mottling of the skin of the abdomen, trunk and extremities.

(2) An erythematous eruption, transient in duration and tender to the touch.

(3) Deep tenderness of the muscles and bones.

(4) Excruciating pains in the calves of the legs and ankles, causing some patients to be sent to me as beriberi patients.

(5) Frequency of micturition.

(6) Primary initial fever has not been distinctly observed by me in natives except in rare cases, although it may have been present before they applied to me for treatment.

The writer proposes to deal in brief with the symptoms as seen in Europeans, and then as seen among native races.

Europeans.

Incubation.—This is very variable. Twelve days (Broden). Others say five to eight years (Guerin).

Some have developed it after having left a contaminated zone for seven years (Gorre, Manson). This period would include latent periods as well as incubation.

One of my patients was repeatedly bitten when entering this area, and almost weekly while in it. He had his initial fever six months after entering the infected zone, and rapidly developed all the classical symptoms. Another patient, after residing in a very heavily infected district for nearly four years, could not recall any "fever" except touches of malaria, but trypanosomes were found in his blood.

The actual period of incubation is uncertain.

The Initial Fever.—This is not always present, but the following symptoms are early and important:—

A period of nervous exhaustion, weakness, headache, frequency of micturition—probably four to eight times in the night—and sleeplessness. These symptoms may be seen days or weeks before there is any fever, and out of all proportion to the prodromal symptoms of malaria. The appetite is good, the bowels more or less normal, and no malarial parasites can be found in the blood either before, during, or after the fever in uncomplicated cases. The body-weight is maintained. In febrile cases the temperature rises 1° to 2°, or even 5° F., and keeps above normal in spite of heroic doses of quinine. The fever is accompanied by a condition of marked prostration. One patient became unconscious before he could be brought 100 yards into the hospital. The headache, sustained temperature, and prostration make one suspect the onset of typhoid fever. Then one notices that the lymphatic glands are enlarged, chiefly the posterior cervical glands, which are elastic and movable. They vary in size from a pin's head to an almond; very rarely are they found to be much larger.

There is nearly always some congestion of the conjunctival vessels, but not more than would be expected in any febrile disorder.

The sleeplessness, nocturnal micturition and headache are troublesome; large doses of opiates may be necessary to give relief.

Recovery is slow; there may never be complete recovery to the previous normal standard of health.

At this time or later there are:—

Cutaneous Disturbances.—(1) *A blue mottling discoloration* of the abdomen, which is probably almost a unique sign. It then affects the chest, back, thighs and upper arms. The extent of the coloration is only fully appreciated when one presses the thumb on the central part of the abdomen and notices the difference between the temporary white patches and the surrounding bluish tint of the skin. This tint is persistent.

(2) *The erythematous eruptions* are completely distinct from the above. They are pink or reddish in colour, not raised patches with clear centres which may appear on any part of the trunk or extremities. They may be circular, circinate, horseshoe shape, or lineal in form. They may come and completely disappear in two days, some coming while others are disappearing. They are extremely tender to the touch. To pierce a patch with a hypodermic needle is like "plunging in a red-hot poker," as one patient described it to me. Sometimes there seems to be some local œdema about these patches, but it is not very marked. Coinciding with these, or a little later, appears a —

(3) *Vesiculo-papular eruption* which has not been present in my cases.

Kerandal's Symptom.—There are very real deep pains on pressure over muscle and bone. The painful areas may vary from day to day, but those of the calves usually persist. There may be a very painful tenderness about the scalp, so that lying on a pillow at night is painful; or over the prominent bones of the face, so that it is difficult to wash oneself properly; or over the hands, arms and legs, so that the slightest knock gives a pain far in excess to the blow, and which can be felt for hours and days afterwards.

The muscles of the legs cannot be touched, and in this particular they simulate beriberi cases.

There may be pain about the ankles, so that one is prevented from walking. Such were so agonizing in two of my cases that it was as if one was wrenching off the foot at the ankle-joint. Sleeping and walking are almost impossible. The pains are always worse at night. Nothing will touch them but strong opiates. Massage is unbearable. One may also notice:—

Œdematous Patches.—These painful œdematous patches may occur on any part of the body; about the erythematous patches: on the hands, about the fingers, on the legs or feet. They simulate rheumatic swellings, but sleeping sickness patients manifest them when rheumatism can be excluded. They last from several days to two weeks.

Vascular Manifestations.—Trypanosomes should be sought for repeatedly in thick fresh blood preparations. Some severe cases have never shown trypanosomes even in centrifugalized blood. Stained specimens take too long for diagnosis in the Tropics when there are many cases to do, but they are essential for the details, &c., of the organisms. The writer has found trypanosomes in the fresh blood without any other symptom of the disease being present at all, other than some enlargement of the posterior cervical lymphatic glands. One such case received Fowler's solution and was invalided to Europe, but he has since returned, declared by Dr. C. W. Daniels to be free from all signs and symptoms of the disease.

One can mistake microfilariæ for trypanosomes in unstained specimens, but they are much larger and slower in movement. I have seen trypanosomes and microfilariæ in the same field. A sixth objective and a No. 2 eyepiece show up trypanosomes readily. The active movement of the trypanosome lashing the cells to and fro soon betrays its presence.

Auto-agglutination is important, but it is not

pathognomonic. It occurs in other diseases, and is only of importance when they can be excluded.

The blood may be pale in colour, slimy in consistency; the cells adhering together like clusters of grapes rather than showing the normal formation.

Polyadenitis.—This is more or less general, but the cervical are the most important, those in the posterior triangle especially (Winterbottom's sign). Their enlargement in individuals living in an infected area should arouse one's suspicions. They are soft and elastic when enlarging, but become shrunken, hard and fibriotic when the disease has cleared up, hence they may be present long after the disease has been cured. They are usually painless, and seldom suppurate.

Trypanosomes can be readily found in the glands, but they are small and not easy to puncture successfully. When trypanosomes can be found in the fresh blood it should suffice. In some cases the cerebrospinal fluid is tapped for them, but it is rarely needed. The writer is of the opinion that the disease may be cured spontaneously in the vasculo-lymphatic stage. He has known cases of apparent healthy natives remaining healthy for two and a half years with enlarged cervical glands, but without any trypanosomes being found in the blood, although the individual has lived among hosts of infected natives and tsetse-flies.

Eye Symptoms.—Iritis and iridocyclitis may necessitate the removal of an eye. Daniels suggests that it is a late manifestation of the disease corresponding to the para-syphilides. The presence of iridocyclitis in animals suffering from trypanosomiasis which were readily cured under arsenical treatment attracted attention to this symptom in human trypanosomiasis cases.

J. W. H. Jellett saw a case of iridocyclitis and keratitis punctata in Northern Nigeria which he ascribed to trypanosomiasis.

Eye symptoms have not been present in my cases.

Weakness.—This is as a rule out of all proportion to the febrile symptom, and is persistent in spite of a good appetite. Well-developed men have needed to rest frequently during the day, in order to attempt the continuance of their duties of supervision.

Orchitis.—This has been noticed.

One must not expect, however, that all these symptoms will appear in any one patient; sometimes there are trypanosomes and adenitis only, while others may show all the signs and symptoms except trypanosomes in the blood. Adenitis in a non-syphilitic living in an infected zone is suspicious.

Blue mottling of the skin is almost pathognomonic of the disease.

Erythematous eruptions with deep pressure pains are enough to begin anti-trypanosome treatment.

Auto-agglutination is important.

Trypanosomes found in the glands, blood, or cerebrospinal fluid are conclusive.

The *treatment* is the same as for coloured peoples, and is dealt with below.

Symptomatology in Natives.

The experience of the writer confirms that of Dutton and Todd in Gambia that in natives the first phase of the disease need not be accompanied by any morbid manifestations. I have one adult male who shows trypanosomes every time they are sought for, but he has never manifested any other signs or symptoms of the disease whatsoever. For years he has lived in a very heavily infected district; his wife and child died of the disease, but he remains particularly active in body and mind for a native, and has remained so during the past two and a half years since I have known him. I have observed many others over the same length of time in whom trypanosomes have been found, but who have not yet shown any other signs or symptoms of the disease, and who have not received any treatment whatsoever. These are a danger to the public, as they are "carriers" of the parasite—more danger to others than they are to themselves.

In considering the possible manifestations of the disease, one should recall that the disease is in the main one of the lymphatic system. It is only when we realize this fact that we can account for some of the œdemas so commonly present among sleeping sickness victims. There are probably four factors at work in producing the œdemas of this malady:—

(1) Some disturbance of nerve control, owing to toxic products causing lymphatic irregularities. It is known that the lymphatics are supplied mainly by non-medullated nerves, and some obscure œdemas are known to result from injuries to such nerves.

(2) Vascular toxins also increase the normal secretion of the endothelial cells of lymphatic tissue. Normally the flow of lymph is slow and at a slow pressure.

(3) The disease also causes an increased permeability of the vessel walls, and hence a passive exudation and a resulting œdema of the part.

(4) Death often takes place from heart failure. I have observed that the depressing action of tartar emetic given intravenously will precipitate œdemas and heart failure even when preceded by ammonium carbonate *per os* and caffeine injections subcutaneously.

The toxin from the trypanosomes probably acts upon the heart muscle or through the vagus, an action intensified by tartar emetic in some cases.

There are Two Stages of the Disease, often with a Latent Phase between.

(1) *The Trypanosome Fever Stage.*—There is an infection of the lymphatics and the blood-stream. The infection is characterized by polyadenitis, intermittent irregular fever, tachycardia, enlargement of the spleen, cutaneous eruptions, and weakness. Trypanosomes are found in the lymph-glands and the blood-stream.

This condition is curable in some instances.

Most cases will die if untreated.

(2) *The Sleeping Sickness Stage Proper.*—The infection has reached the cerebrospinal system.

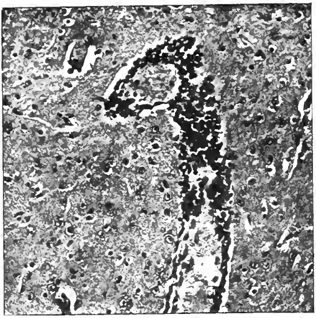


Fig. 1

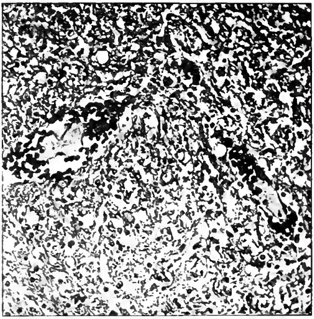


Fig. 2.

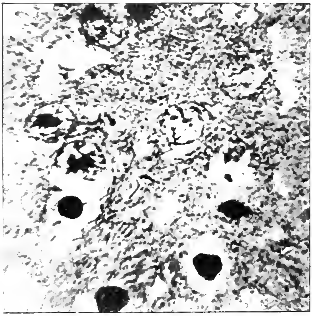


Fig. 3.

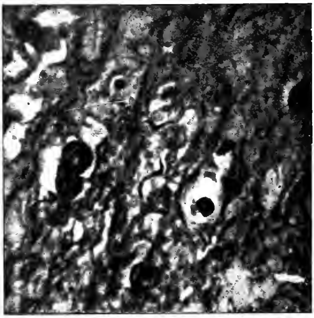


Fig. 4.

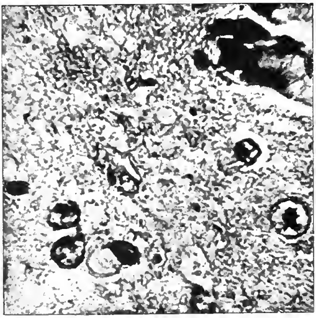


Fig. 5.

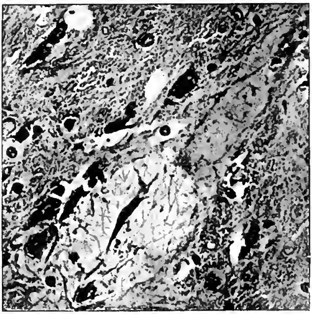


Fig. 6.

To illustrate paper "The Presence of Trypanosomes in Brain Substance" by A. C. Stevenson, M.B., D.P.H.

This stage is characterized by an aggravation of the general symptoms, wasting, weakness, nervous disturbances, such as trembling, paralyses, apathy, somnolence, lethargy, hallucinations, mania, and coma.

Trypanosomes are readily found in the cerebro-spinal fluid, but less readily in the glands and blood-stream.

We will now deal with these a little more in detail.

(To be continued.)

THE PRESENCE OF TRYPANOSOMES IN BRAIN SUBSTANCE.[1]

Preliminary Note by A. C. Stevenson, M.B., D.P.H.
Wellcome Bureau of Scientific Research.

Although a considerable amount of work has been done on the changes of and appearances in the brain in cases of sleeping sickness in man and in the brains of experimental animals inoculated with trypanosomes isolated from such cases, I have come across only one description of the parasites being found in the brain substance itself.[2] In this description the experimental animal was the monkey. In this and other experimental animals trypanosomes have been seen and described by various observers in the meninges, capillaries, and perivascular tissue of the brain. I can now record a case of trypanosomes occurring and dividing in the brain of another experimental animal, the guinea-pig.

When Lieutenant-Colonel Wenyon left this country on military service he left his experimental trypanosome animals under my care. Some of these animals were inoculated with trypanosomes isolated by Colonel Wenyon when he was teaching at the London School of Tropical Medicine from cases under Dr. Daniel's care in the hospital there, and it is on one strain of these that the following observations were made. I am unable, owing to Colonel Wenyon's absence and my not having access to his notes, to give full particulars of the origin and isolation of this strain, but I believe it to be *Trypanosoma nigeriense*, as it was so labelled, and its morphological characters bear this out.

A guinea-pig inoculated with this strain showed after about five and a half months some weakness of the hind-quarters, which became more definite in the next two weeks, at the end of which time the animal was found dead one morning. The brain was removed, fixed, and paraffin sections made. Trypanosomes, many of which were dividing, were found scattered through all parts of the brain substance, with no special relation in many cases to the capillaries and smaller blood-vessels. If anything, they were most numerous in the mid-brain. The small-celled infiltration of the perivascular tissue, so pathognomonic of sleeping sickness, was well-marked, and masses of trypanosomes were seen in the same situation.

In another guinea-pig inoculated from the above, which only lived for four months and died very suddenly without symptoms, sections of the brain showed a large number of trypanosomes in the blood-vessels. In the brain substance trypanosomes were only found after prolonged search, and then only near the surface of the cerebral hemispheres. The perivascular infiltration was absent in the substance of the brain, but a small amount was seen around the vessels of the pia mater. In the medulla below the floor of the fourth ventricle there were numerous capillary hæmorrhages which contained numbers of trypanosomes. These hæmorrhages may have been the cause of death.

In neither of these two brains were Gram-staining streptococci, such as are often found in sleeping sickness brains, seen in the sections.

Description of Plate.

Figs. 1 and 2.—Small round-celled infiltration around small vessels of the brain in grey (1), and white matter (2). × *circa* 170 diameters.

Fig. 3.—Trypanosome in grey matter. × 1,000 diameters.

Fig. 4.—Two trypanosomes in white matter. × 1,000 diameters.

Fig. 5.—Nuclei and portions of trypanosomes near infundibulum. × 1,000 diameters.

Fig. 6.—Capillary hæmorrhage in medulla with trypanosomes and dissected out nerve cell in clot. × *circa* 360 diameters.

Figs 1-5 are from sections of brain of the first guinea-pig mentioned in text. Fig 6 is from brain of second guinea-pig.

Relapsing Fever in East Africa (De Ruddere, *Archives Médicales Belges*, August).—Relapsing fever among the Belgian troops on their victorious march through German East Africa affected black and white troops alike. The ticks that transmit this disease are rare in the Belgian Congo, but are extremely numerous in German East Africa, especially along the caravan routes. The disease is easily recognized by the frontal headache and pains in the bloodshot eyes. The spirilla are found in the blood during the febrile attack, but not at other times. Salvarsan and its substitutes did not seem to have any curative action except at the first attack, but they materially relieved the pain and discomfort at each relapse. The duration and frequency of the attacks did not seem to be modified by them in the least. Iridocyclitis is a comparatively common complication, but this yielded to salvarsan or atoxyl in his experience. One man succumbed to complicating epistaxis, and in most of the severe cases the heart muscle was modified, the heart sound duller, and the pulse small and fast during and between the relapses. There may be ten or fifteen relapses of tick fever, and the men are sick with it for a total of rarely less than three months.

[1] By the kind consent of the Director the necessary inoculations were carried out in the Graham Research Laboratories, University College Hospital Medical School.

[2] "A Contribution to the Parasitology of Trypanosomiasis," Wolbach and Binges. *The Journal of Medical Research*, September, 1917.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JANUARY 15, 1918.

BLINDNESS IN INDIA.

AT a meeting of the Humanitarian Corps of the College of Ambulance, London, a paper was read by C. G. Henderson, Esq., Indian Civil Service, on "Blindness in India." Mr. Henderson's paper was chiefly devoted to the possibilities of the diminution of blindness, and he sketched a plan by which an advance could be made in this direction.

As to the great prevalence of eye disease in India, all those at the meeting who knew the country well were agreed. Amongst these were Surgeon-General Evatt, C.B., the Chairman; Surgeon-General Sir Havelock Charles, G.C.V.O.; Sir Francis and Lady Lely; Mr. K. J. Mortimer; Mr. W. S. Burfoot and others.

Mr. Henderson and all present testified to the good work done by the Indian Medical Service officers in India, who, from the opportunities afforded in India of obtaining a wide knowledge of eye diseases acquired a skill in operating which was superlative and unique in the world. It has also to be stated that the Government of India has done a great deal to help to alleviate the suffering from eye diseases; and that municipal authorities in some districts have organized aid in this direction. In the large cities and in good-sized towns ophthalmic hospitals and dispensaries have been established and do estimable work. But it is amongst the people in villages, and especially in the country districts—the peasants, in fact—that apathy chiefly prevails and opportunities for treatment are few and far between. It is the backwardness, apathy and ignorance of the population that is the main cause of the existing evil. The matter of the extent of blindness and eye diseases in India is not to be thrust aside by some such remark as that in India, as in other warm climates, blindness owing to climatic conditions must be expected; for amongst Europeans in India and amongst the intelligent and educated Parsees blindness is extremely rare.

The Indian peasant, like others who may claim to be more advanced, fails to realize the danger of eye complaints which may, if neglected, lead to blindness. Even where medical facilities are near at hand he, as well as his fellow townsmen, will often fail to avail himself of them, and when, for a complaint which he may regard as trivial, he has to travel many miles and attend regularly at a distant dispensary, it is not a matter for much surprise that he remains in his village and suffers the consequences of his neglect. This is not to say that Government hospitals and dispensaries are not often popular and well attended by patients for various complaints, but for eye diseases the numbers who will attend constantly and regularly are small compared with the frequency of these complaints. The Indian public would like medical facilities to be brought almost to their very doors, and many an eye is destroyed by the travelling quack who visits the villages and persuades his patients to submit to his unskilled operations.

The chief point under discussion at the meeting was how to bring home to the peasants and villagers in India the necessity, the imperative necessity, of bringing those who suffer from eye disease, especially children, to the doctors for treatment.

To the peasants a European is an unfamiliar being, seldom seen, and if seen it is more often in a law court than elsewhere. Their idea of sahibs, even doctors, is as of beings apart, and that they should take interest in such a trivial

thing as an eye complaint of one of their children is inconceivable; with the townsfolk it may be different, but with the peasant on the land his knowledge of Europeans is limited in the extreme.

It is estimated that the totally blind in India number 600,000; this estimate does not include the blindness of old people from cataract, &c., but exists amongst people up to the age of 50. Of these blind people at least 30,000 could be given more or less vision could they be sought out and brought to take advantage of medical facilities. This statement strikes at the root of the whole matter. "Could they be sought out and brought to take advantage, &c.?" This number, 30,000, may appear a small number when the population of India, some 300,000,000, is considered; but it is about as many as all the blind in the United Kingdom, and, as Mr. Henderson remarked, "What would we do to give sight to all the blind in the United Kingdom? But they are there—in India, in a part of the British Empire—thirty thousand blind persons to whom some sight could be given were there the organization and the will to help them. And not now only, but from generation to generation, for the figures of blindness vary but little from Census to Census. And let it be remembered that this does not include the many thousands who are only partially blind, but whose sight could be much improved by proper medical treatment, and it does not include large numbers of old people. I should perhaps explain that I am dealing here with people who would of themselves, in all probability, never take advantage of the medical facilities that exist. Of course, numbers of blind do of their own accord attend hospitals and undergo operations. But I have carefully excluded all such cases from my calculation, which represents mainly those of the poorer and more ignorant classes who would never have been likely, but for a certain amount of friendly pressure and occasional pecuniary assistance, to betake themselves to hospitals or qualified medical men. The figure of 5 per cent. of cases of remedied blindness must be taken to refer only to such people and not to include the more intelligent and enterprising who need no pressing to seek medical advice."

Mr. Henderson on his own initiative took steps to inquire into the prevalence of eye disease in two of the districts in the Bombay Presidency. He had prepared for him by the head man in every village which he proposed to visit lists of blind people and those suffering from any kind of eye disease. These people were assembled and their numbers and complaints noted. They fell under three classes: "The totally blind for whom nothing can be done; the totally blind to whom an operation would give some sight, or the partially blind whose sight could be improved by an operation or other medical treatment; and those who are suffering from disease which if not treated will end in loss of sight or great impairment of vision. With the exception of the hopelessly blind for whom nothing could be done, or the very aged, these persons have in large numbers been sent to the most suitable dispensary or hospital for the necessary treatment."

These folks would not have gone to the hospital had it not been for the friendly encouragement to do so by Mr. Henderson, and it is this friendly encouragement that constitutes the kernel of the whole matter. The people must be approached by sympathetic advisers who with kindly words can persuade the mother to bring her child for treatment. Even with the hospital near at hand, as in towns, people persist in neglecting to take advantage of the help at hand, or stay away through the influence of the persuasive quack, who takes the payment and sacrifices the sight of his deluded victims.

Even with the hospital near at hand, as in large towns, the parents all too often refuse to take advantage of treatment from apathy and ignorance; and how much more so with the peasant, who may have far to travel, for the most part over bad roads, and at an expense which it is impossible for the parents to afford?

Sir Havelock Charles strongly advocated the extension of ophthalmic travelling dispensaries. These, he said, already existed in considerable numbers in certain districts in India, and their numbers will be extended as possibilities of doing so occur. The good they do is incalculable, and it is only by these that sound advice and treatment can be brought to the peasant's door. To create a partially trained medical assistant department at a low salary to carry on the work of relief in eye complaints or any other medical remedial measure was not a system to encourage in India nor anywhere else.

The gist of the conclusions come to was that what was wanted was people more of the nature of health visitors to go round the districts to seek out the afflicted, and to advise parents by friendly persuasion, and, when necessary, to arrange to have the work of the peasant done whilst they took the sufferer for treatment to the hospital, the dispensary, or the travelling ophthalmic hospital. If the distance was great pecuniary help should be arranged for to pay the travelling expenses, either from private, municipal, or Government sources.

Mr. Henderson hoped through the Humanitarian Corps to keep people in Britain in touch with the subject of eye diseases in India and the terrible consequences of their prevalence. He hoped that between the Humanitarian Corps at home and those interested in the work in India and elsewhere throughout the world a direct channel should be established.

Sir James Cantlie, who represented the Corps, promised that this should be done, that a committee would be formed, and a scheme considered to further the work on the lines Mr. Henderson and those present advocated.

Many interesting accounts in reference to work amongst the blind were given by Surgeon-General Evatt, C.B.; by Mr. T. R. Monerieff on work in Britain; by Mr. Thomas Cochrane on eye diseases in China; and by several officers of the Salvation Army who had worked for many years, some as long as twenty and thirty years, in India.

Annotations.

Acetonæmia in Children (G. Guidi, *Rivista di Clinica Pediatria*, October).—An attack of periodical vomiting with acetonæmia may resemble acute appendicitis. Palpation of the appendix region through the rectum is sometimes the only means to clear up the case. In case of persisting doubt remove the appendix. There is always a possibility that the two affections may be associated. Three cases are described; profuse elimination of acetone by the breath and kidneys was accompanied by frequent vomiting and occasional severe diffuse pains in the abdomen, the pulse fast and small, and the children were restless and felt badly, and there was no stool. The abdomen was distended, but this was uniform, and no specially tender points could be found. While the surgeon was studying the first case with the internist all the symptoms suddenly subsided. No purgatives had been given, but slight peristaltic movements were detected, while the abdominal walls were not contracted. The acetonæmia subsided under large doses of sodium bicarbonate by the mouth or rectum. There was no movement of the bowel until the fifth day, but by the end of the week the child seemed to be perfectly well again. This child and the second were under 3, the other was 6. This was the first attack of acetonæmia in the last two cases; the first child had had at 18 months a similar attack of vomiting with abdominal symptoms. The intestines in the three cases seemed much dilated—evidently a paresis from the toxins in the blood. Other cases of acetonæmia have paresis of the bladder and retention of urine, compelling catheterization, but these disturbances are always transient and disappear with the acetonæmia.

Prevention of Simple Goitre in Man (D. Marine and O. P. Kimball, *Journ. Laboratory and Clinical Medicine*, October).—Examination of the thyroid in the girls of the school population of a large community in the Great Lakes goitre district found 1,688, or 43·59 per cent., normal thyroids; 2,184, or 56·41 per cent., enlarged thyroids; 594, or 13·4 per cent., had well-defined, persistent thyroglossal stalks. The community lies near the southern edge of the goitre district, and it is suggested that communities near the lakes would show a higher incidence. The following method of prophylaxis proposed is in operation. For the prophylactic treatment the authors have selected sodium iodide on the grounds of economy and ease of administration. One mg. of iodine given weekly by mouth is ample to prevent goitre in dogs. In all their dispensary experiments with children the authors used either syrup of hydriotic acid or syrup of ferrous iodide, in 1 c.c. doses, daily for two or three weeks, repeated twice yearly. They have, therefore, arbitrarily selected to use 2 grm. sodium iodide, given in 0·2 grm. doses each school day, for each pupil in fifth, sixth, seventh and eighth grades; and 4 grm. given in 0·4 grm. doses each school day for each pupil in ninth, tenth, eleventh and twelfth grades. These amounts will be given twice annually about the first of May and December at the schools by the teachers or nurses. These amounts of sodium iodide provide approximately 1,700 (1,692) mg. of iodine for each pupil of the fifth, sixth, seventh and eighth grades, and approximately 3,400 (3,384) mg. for the ninth, tenth, eleventh and twelfth grades.

Control of Venereal Disease in America. (Regulations Kansas State Board of Health, November 2, 1917.) Camp Funston and Fort Leavenworth Extra-Cantonment Zones. (From *Public Health Reports*, November 23, 1917).—Health officers designated for the extra-cantonment are authorized to use every available means to ascertain the existence of and immediately to investigate all suspected cases of syphilis in the infectious stages and gonococcus infections within their cantonment zone, and to ascertain the source of such infection.

Health officers are vested with full powers of inspection, examination, isolation and disinfection of all persons, places and things, and are hereby authorized:—

(*a*) To make examination of all persons reasonably suspected of having syphilis in the infectious stages of gonococcus infection. Owing to the prevalence of such diseases among prostitutes all such persons may be considered within the above class.

(*b*) To isolate such persons, whenever in the opinion of said deputy State health officer, the State Board of Health, or its secretary, isolation is necessary to protect the public health.

In establishing isolation the health officer shall define the place and the limits of the area in which the person reasonably suspected or known to have syphilis or gonococcus infection, and his (or her) attendant, are to be isolated, and no persons, other than the attending physician, shall leave the area of isolation without the permission of the health officer.

(*c*) In cases of quarantine or isolation not to terminate said quarantine or isolation until the cases have become non-infectious or until permission has been given by the deputy State health officer.

Cases of gonococcus infection are to be regarded as infectious until at least two successive smears taken not less than forty-eight hours apart fail to show gonococci.

Cases of syphilis are to be regarded as infectious until all lesions of skin or mucous membrane are completely healed.

(*d*) Inasmuch as prostitution is the most prolific source of syphilis and gonococcus infection, said deputy State health officers, or their duly authorized representatives, are authorized to use every proper

means to aid in suppressing the same and not to issue certificates of freedom from venereal diseases, as such certificates may be used to purposes of solicitation.

(*c*) Keep all records pertaining to said inspections and examinations in files not open to public inspection, and to make every reasonable effort to keep secret the identity of those affected by venereal diseases control measures, inasmuch as may be consistent with the protection of the public health.

Peas in Treatment of Deficiency Diseases (D. J. H. Pol, *Nederlandsch Tijdschrift voor Geneeskunde*, ii, No. 10).—In Norway it was found a few years ago that the Norwegian gray pea seemed to be effectual in curing ship beriberi. A trial of these peas (*capucijners*) in the Netherlands West Indies showed that they were effectual also in curing Asiatic beriberi, but katjang hidjoe, better known as the *Phaseolus radiatus*, of the bean family, is more powerful. These experiences confirmed the deficiency in vitamines as responsible for the symptoms in both these diseases, although the ship beriberi never develops in the acute form sometimes observed with the Asiatic type. With the former œdema gradually extending upward from the ankles is more common than paralysis, and proper food arrests the trouble at once. The European land type of beriberi usually runs a subacute course, and there is always paresis with or without slight œdema. Pol reports in detail a case of this kind in a previously healthy man with three healthy children. He developed ascending paresis which gradually became actual paralysis within five or six months. Even the organ of speech was involved, so that speaking fatigued him; the arms and legs were quite paralysed. By the sixth month the paralysis was apparently grave until the possibility of the trouble being a deficiency disease was suggested, and the diet was changed to include peas and phaseolus. As the supply of the latter soon gave out, the peas were the main reliance. They were given cooked and also in the form of a decoction, of 2 kg. boiled down to 1 litre, added to his usual food. No benefit was apparent for seventeen days, but then the paralysis began to subside, and in two weeks the paralysis of the legs had disappeared, the improvement continuing to progress in arms, hands, and around the mouth in turn, the tongue being the last to return to normal. Fortunately, the long interval before improvement began had not discouraged either physician or patient. When improvement began it was rapid for a while, and then subsided into a slow and gradual phase of improvement, corresponding to recuperation of the actually degenerated nerve cells. Traces of paresis were still evident by the eighth month, but there is every reason to suppose that complete recovery will follow in time. The man was a sergeant instructor of the fortress artillery and had to work in water part of the time.

Abstract.

OUTBREAK OF PLAGUE ON S.S. *SARDINIA* AND *MATIANA*, 1917.[1]

By W. M. Willoughby.

The s.s. *Sardinia*, from Melbourne, via Bombay and the Mediterranean, arrived at Gravesend on May 2 with a crew of 45 Europeans and 129 natives of India and 32 passengers. Five cases of plague had occurred during the voyage. Two natives died on the way up the Channel and were buried at sea, a third died before removal, and two more cases were discovered in the examination of the ship on arrival at Gravesend. The two cases and the corpse were removed to hospital, and the ship was detained at Gravesend. On the following day, May 3, a lascar was found to have fever without other symptoms and was removed to hospital; he died of plague on May 8. A seventh case was taken ill on board on May 6 and died of plague on the 9th. Six of the seven cases were in natives of India and one in a British storekeeper.

The ship's movements were as follows: Left Sydney, February 23; Melbourne, February 26; was at Bombay March 19 to 22; thence via Aden, Suez, Port Said, and Malta to Marseilles, where a stay from April 13 to 16 was made for discharge of cargo. After further discharge of cargo at Gibraltar on April 22 the ship arrived in the Channel on April 29 and at Gravesend on May 2.

Tabulation of Cases.

	Rating	Berthing in forecastle	Date taken ill	Result
1	Lascar	Starboard	April 27	Died Apr. 30
2	Coal-trimmer	Lower	,, 27	,, May 1
3	,, ,,	,,	May 1	Recovered.
4	Fireman	Port	,, 1	Died May 2
5	Storekeeper	Alleyway	April 28	Recovered
6	Lascar	Starboard	May 3	Died May 8
7	,,	,,	,, 6	,, ,, 9

Cases 1, 2 and 4 presented large cervical buboes, Cases 5, 6 and 7 presented femoral buboes, and Case 3 presented an inguinal bubo. Case 6 was a septicæmic one without local lymphatic incidence; from beginning to end the only sign was fever. Films made from the viscera of Cases 4, 6 and 7 at the hospital gave abundant bipolar bacilli. Pus from Case 3 was found by the pathologist to the Local Government Board to be infective on animal experiment.

The British storekeeper, Case 5, gave a straightforward history of onset, being awakened in a shivering fit and finding tenderness in the region of the femoral glands in the early morning of April 28. None of the cases were pneumonic in type at any stage of their history.

[1] Abstracted from the *Lancet*, December 8, 1917.

All the cases occurred in the fore part of the ship. The starboard top-gallant forecastle is devoted to deck crew, and the port to the firemen and coal-trimmers. Approached from the port forecastle is a 'tween deck quarters appropriated to the coal-trimmers. Cases 1, 6 and 7 were in lascars who berthed close together in the starboard forecastle. Cases 2 and 3 in coal-trimmers occupying the 'tween deck quarters, and Case 4, in a fireman occupying the port forecastle, berthed next the stairway leading to the 'tween decks. The British storekeeper lived in a cabin opening into the starboard forecastle-alleyway. It is noteworthy that the native food was kept in a storeroom in the forepeak, approached by a trap and ladder in the floor of the starboard forecastle; also that the natives' galley was situated amidships at the forecastle. The native food-store was quite shut off from direct communication with the holds, being situated ahead of the collision bulkheads.

Rats.

The cargo from Australia consisted largely of wheat, flour, skins and dried fruits; that from Bombay of pears, lentils and Acajou nuts; the holds would therefore form an attractive nidus for rats. At Bombay traps were procured on account of the number of rats which had been seen since leaving Australian ports. At Marseilles the foreholds were fumigated with sulphur dioxide, the cargo being *in situ;* the fumigation was carried out by means of the Clayton apparatus. It is usual to fumigate holds containing more than 500 tons of cargo destined for Marseilles from an infected port such as Bombay. Three dead rats were thrown out from the carpenter's storeroom adjoining the food store and situated in the forepeak soon after the ship left Marseilles. The significance of the dead rats was not noticed at the time; the mortality was ascribed to the Marseilles fumigation, although the rats were found in front of the collision bulkhead where fumes could not have reached them.

The ship left Marseilles on April 16, and the first human case occurred on April 27. It was said that a sick rat had been seen by some member of the crew soon after leaving Port Said. The British storekeeper, one of the first cases, issued the native stores, for which purpose he went periodically down into the storeroom, often only in slippered feet. In a former experience of plague in the port the issue of native stores was the duty of the *kasab*, and he alone of the crew was attacked by the disease; he had thrown dead rats out of the storeroom; his bubo was femoral also.

It is probable that infected rats found their way on board at Bombay with the food cargo taken there, and that the infection was more or less confined to the holds until arrival at Marseilles; and that here rats, some of which were infected, gained access to the forecastles and food store, infecting the rat inhabitants already in the forecastle quarters, and themselves taking up their habitation there, where the galleys and the food store formed an ample attraction. The fumigation of the foreholds at Marseilles gives rise to the suspicion that rats may have been even driven to the living quarters; it is a difficult matter to effectively fumigate the holds in the presence of cargo. The hatches were lifted after fumigation at Marseilles, and again at Gibraltar. In addition to the possibility thus afforded of infection taking place along the deck, the following structural detail is worthy of notice. The chain lockers on the *Sardinia* are connected to the bilges by a scupper; this is a good exit for rats from the holds in case they are disturbed there. The chain lockers communicated with the lower forecastle by a trap-hatch, which was opened at Bougie and again at Gibraltar to stow chain. The chain locker would form a refuge for rats in case of an incomplete or ineffective fumigation. Two of the cases occurred in the lower forecastle. These facts may have a joint significance. Again, the native food store is ventilated to the extreme forecastle-head by a goose neck; the chain pipes and this goose neck form a path of no difficulty to a rat, from chain locker to food store. The partial fumigation is thus a possible determining factor in the human outbreak. Theoretically, holds should not be fumigated where infection is suspected without simultaneous fumigation of at least that human accommodation to which access from the holds may be gained by rats.

Preventive Measures.

The measures taken with a view to prevention of spread of plague on board and ashore were as follows: —

The cases were removed to hospital and the whole of the crew and contents of the infected quarters removed for bathing and steam disinfection respectively. While the men were bathing at the disinfecting station their clothes were passed through the Washington Lyon apparatus and their quarters on board fumigated by burning sulphur candles, one pound to the 1,000 cubic feet therein. This implied the simultaneous fumigation of the forepeak. The time of exposure to sulphur dioxide was over fifteen hours. These measures were calculated to make the living quarters temporarily safe for habitation with respect to rats and fleas.

The passengers were landed forthwith on arrival: their names and addresses were forwarded to the several sanitary authorities at their destinations in accordance with the system of "surveillance" which has superseded quarantine in this country. The crew remained on board under daily observation; if a member of the white crew were permitted to go off the ship for a short period "surveillance" was assured.

Cargo was completely discharged into barges while the ship lay on quarantine grounds and before the fumigation for finally ridding the ship of rats was made. This implied observation of each package passed overside to see that no rat escaped therewith; the mooring ropes of the barges were

guarded against escape of rats by way of them. The grain cargo was shot out of sacks overside, flour sacks were scrutinized to prevent possible transfer of a contained rat. Bundles of skins would form a likely nidus; these were watched both on loading and discharge of the barges; a dead rat was found in one of these bundles. As a further precaution much of the cargo was stored for fourteen days or longer, and a watch set on the rat population of the neighbourhood of storage. Goods for transmission to America may require certification either of freedom from infection or of disinfection. Goods stored thus were certified.

The ship-workers were clad in overalls tied in at the ankles and wrists against possible attacks by fleas; all workers were placed under "surveillance" in the way described for passengers. Everybody concerned with the ship was alive to the danger from rats and to the circumspection with which they should be treated, whether alive or dead.

On complete discharge the ship was filled by means of the Clayton apparatus with 3 per cent. sulphur dioxide gas.

A single illustration shows the necessity of simultanous fumigation of crew accommodation and holds.

The cabin situated opposite the insulated meat store in the port alleyway amidships was filled with fumes from No. 4 hold on fumigation of this hold; the store was similarly filled. The connections between the hold and these rooms were rat runs. Under fumigation of the holds alone rats could be driven into these places and thence into the whole of the adjoining quarters; this would be the more likely to occur if, owing to the presence of cargo or otherwise, the fumigation were rendered inefficient or diffusion slow. Forty-one dead rats were found on search after the fumigation.

The ship arrived late on May 2. Case 7 occurred on May 6 and the precautionary fumigation of quarters was made on May 3. Nobody was infected after these precautionary measures. Three cases from the starboard forecastle bunked in close proximity to one another suggests the possible direct infection through fleas without the intervention of the rat. The point is of interest, as there is the bare possibility of reinfection of the forecastle before the ship was discharged of cargo and finally fumigated.

The measures taken were completely satisfactory; in the result no human or rat infection gained the shore. The ship left the district on May 17.

The Outbreak on the s.s. "Matiana."

The s.s. *Matiana* from Bombay via the Cape arrived at Gravesend on August 13 last, and nine cases of plague were reported to have occurred; six of the native crew had died, and three were removed convalescent to hospital. On August 14 a tenth native was taken ill, and died of plague on August 16 in hospital.

The ship left Bombay, the port of lading, on June 9, and was at Delagoa Bay from June 26 to July 6. Cargo was discharged there. As a preliminary to discharge the forehelds Nos. 1 and 2 were "fumigated" by means of cylinders of gas thrown into them.

The list of crew attacked is as follows:—

	Rating	Age	Reported ill	Bubo	Result
1	Saloon boy	30	July 16	Axillary and supraclavicular	Recovered
2	Lascar	19	,, 16	None	Died July 22
3	Punkah boy	22	,, 17	,,	,, ,, 21
4	Lascar	20	,, 17	Right femoral	,, ,, 22
5	,,	27	,, 17	Right submaxillary	Recovered
6	Coal-trimmer	20	,, 22	Left groin and neck	Died July 25
7	Lascar	19	,, 24	None	,, Aug. 2
8	,,	22	,, 25	,,	Recovered
9	Serang	29	,, 28	,,	Died Aug. 1
10	Lascar	—	Aug. 14	Right axillary	,, ,, 17

It is probable that Case 8, who only presented severe bronchitis while in hospital, had not been plague-infected at any time of his illness. Pneumococci were plentiful in his sputa and *B. tuberculosis* and *B. pestis* absent. It will be seen that seven-days separate the first group of nine cases from the tenth case. All the cases except No. 6 occurred amongst that part of the crew berthed in the forecastle. The firemen and coal-trimmers were berthed in the 'tween decks amidships on the port side. All the native crew was Mahommedan, and the native galley was situated in the starboard alleyway to the forecastle. The firemen, therefore, would have dealings with the forecastle and its occupants from time to time, and this association may account for the infection of a single fireman, although, on the other hand, the mortality of rats and its distribution show that the ship from stem to stern was plague-infected in the holds.

The port forecastle, devoted to saloon boys, was only separated from the sailors' quarters in the starboard forecastle by open battening. Six of the ten cases occurred in the sailors' quarters and only two among the saloon boys. The case in the serang, who was lodged in the starboard alleyway in quarters bounded on the one hand by the forecastle and on the other by the native galley, brings the proportion to seven sailors and two saloon boys. The point is a small one, but the list to starboard in case incidence is paralleled by the location of the native food in preparation and storage.

Comparative immunity among the saloon boys may be due to the fact that their meals are partly taken in the saloon quarters and much of their time spent there, away from the forecastle.

Rats and Fumigation.

After three deaths, on July 22 the forecastle was thoroughly cleared of all contents and the crew camped on deck. Ten dead rats were found during

this clearance in the forecastle and one in the native food store, which is situated ahead of the collision bulkhead, and is without ingress to rats or human beings save by a trap in the floor of the starboard forecastle. One of the ten dead rats was found lodged in the bundle of clothing which had belonged to a lascar dead of plague.

Under the direction of the ship's surgeon, the forecastle was washed down with disinfectant and fumigated, first by means of formalin, then by sulphur burned in liberal quantity. The native clothing and bedding were steamed in a tub. These measures were evidently effective as regards the infection in the forecastle which caused and resulted from the first nine cases.

The occurrence of the tenth case on the day after arrival in the Thames showed, however, that infection was still present on the ship up to the time of arrival. Smears taken after death from this case gave abundant bipolar bacilli, confirming the diagnosis of the epidemic, which, however, was not in doubt in view of the abundant clinical and historical evidences.

The cargo consisted largely of oil seed and myrobalans, attractive to rats and shipped at Bombay.

During the homeward voyage forty-two rats had been trapped, in addition to those found dead in the forecastle. In the discharge of the cargo in Gravesend Reach seventy-seven dead rats, mostly of the *Mus rattus* (black rat) denomination, were found. *M. decumanus*, however, existed on board; a specimen was trapped and examined for plague at the hospital with negative results.

A rat plague infection of the holds must, on the facts, be assumed to have occurred at Bombay. It was a month after leaving Bombay and a week after leaving Delagoa Bay that the first human case occurred.

At Delagoa Bay a fumigation of the forehold was attempted in the presence of cargo, and the distribution of the rat mortality in the holds as disclosed on the discharge of cargo at Gravesend is as follows:—

Hold No. 1, 5; No. 2, 9; No. 3, 34; No. 4, 29.

Why this paucity of dead rats in Nos. 1 and 2, the "fumigated" holds, as compared with Nos. 3 and 4, the unfumigated?

The suspicion is very strong that in this fumigation rats were evicted from holds Nos. 1 and 2 rather than killed, and that, as suggested in the case of the *Sardinia*, these took up their quarters in the forecastle, which afforded cover and food.

The details of the measure taken at Gravesend are the same as in the case of the *Sardinia*, save that the barges were only permitted to lie alongside during actual work, and no debagging was considered necessary except from sacks, which on scrutiny were found holed so as to permit entrance, and thus transfer, of a rat.

No human infection took place on board after the preliminary fumigation at Gravesend, and no infection reached the shore except in the removals to the disinfecting station and hospital.

Remarks.

Plague-infected ships are rare arrivals in the Thames. It is significant that two outbreaks in quick succession should have appeared, and both in ships in which partial fumigation had been carried out. If there is a direct connection between these partial fumigations and the human outbreaks, two points of great importance arise.

Firstly, the ship's structure and possible paths of communication for rats must be closely investigated in connection with any partial fumigation of a ship and the necessary protection against invasion of living quarters by rats arranged for. No fumigation of holds should be attempted without simultaneous fumigation of living quarters to which a possible path of escape for rats exists.

Secondly, had the human cases not occurred, would the rat infection existing on the ships have been disclosed at the moment for most effective action? Rat infections do pursue their course in undisturbed holds both with and without eventual recognition of the fact of their occurrence.

In practice the present safeguard against the landing of infected rats which may exist on ships from infected ports is the power of port sanitary authorities to put questions and make examinations concerning rat mortality and sick rats. The time for putting the questions is necessarily protracted over the whole period from the ship's arrival to completion of discharge of cargo, and in the absence of repetition of the questions from day to day a discovery of importance may not be disclosed at the proper time for effective action, if at all.

As an additional safeguard it seems desirable that the duty of ascertaining as far as possible the state of the ship with regard to rats both on the voyage and during discharge of cargo, and of immediate notification to the port sanitary authorities of sick or dead rats found, be imposed on owners and officers or other persons in charge of ships as part of the Orders of the Local Government Board relating to Plague.

TREES AND LIGHTNING.

In various parts of the world and in various ages certain kinds of trees have been popularly believed to be immune to lightning, and such have been sought for shelter in thunderstorms. In Ancient Rome these trees comprised the laurel, mulberry, peach, boxwood, &c. To-day in Europe this series is represented by the beech (also in America), birch, linden, and resinous trees. Statistics have shown that over half of the lightning strokes have occurred under poplar trees. The beech stands low in the scale, but the elm, pine, and oak do not show a high per cent. of victims. The analysis will show that other factors aside from mere species determine the relative frequency, as shape and height of trees, isolated position, &c.—*Bulletin générale de Thérapeutique.*

Original Communications.

A CASE OF LARBISH OR ŒRBISS OBSERVED IN NORTHERN NIGERIA.

By J. W. S. MacFie.

West African Medical Staff.

In 1875 Bérenger-Féraud described under the name Larbish a form of "creeping eruption" occurring in French Senegal. Roubaud (1914) has recently published an interesting article on this disease, in which he differentiates it from the "creeping eruption" due to the presence under the skin of dipterous larvæ. Incidentally he points out that œrbiss is a local name for the disease in Senegal, and that this accounts for the term larbish employed by Bérenger-Féraud.

Larbish, or diseases of a similar nature, have been observed in a number of tropical countries, especially on the West Coast of Africa. In West Africa such affections have been described from French Senegal, Sierra Leone, Liberia, and the Cameroons, and the following brief record of a case which came under my observation in 1912, although it adds nothing to our knowledge of the pathology, proves that the disease occurs also in Northern Nigeria.

The patient was a European man who came under observation in June, 1912, at Ilorin in Northern Nigeria. On the dorsum of the right foot at the base of the great toe there was a narrow

track or ridge forming several coils, which had led the patient to believe that he had a guinea-worm which had come to the surface in this situation, and was about to break through the skin. It had been noticed that at the one end the track kept advancing, whilst at the other it gradually faded away. The advancing end of the track was red like a line of erythema, slightly raised, and felt as as if there was a piece of thin string under the skin; the intermediate part was more decidedly elevated, almost like a linear blister, with a zone of erythema on each side, and the hinder end was dried up and in process of scaling off. Vesicles which contained a sero-purulent fluid had formed in the intermediate part.

When first seen the lesion was confined to the dorsum of the great toe. From this position, in the course of a month, it advanced towards the inner margin of the foot, and then took a zigzag course across the sole and back again. The photograph, although a poor one, gives a general idea of the appearance of the track on the sole of the foot. The direction of the advance was irregular. The rate of the advance was also irregular, sometimes imperceptible, sometimes exceeding an inch in twenty-four hours. The elevated part of the track did not, as a rule, exceed about 4 in. in length. The lesion was painless, but caused considerable itching.

The track was frequently opened and explored at various points without discovering any macroscopic parasite. The vesicular fluid was sero-purulent, and contained leucocytes, epithelial scales and bacteria, but no other parasites were found.

"Creeping eruption" is due to the presence of dipterous larvæ under the skin, and similar lesions may be caused (according to Looss) by the penetration of ankylostome and strongyloides larvæ into the skin. In the lesions of larbish no parasites have hitherto been found, and the cause of the condition is at present unknown.

REFERENCE.

Roubaud, E. (1914). "Les Producteurs de Myiases et Agents similaires chez l'homme et les animaux." Paris: Emile Larose.

THE SYMPTOMATOLOGY AND TREATMENT OF HUMAN TRYPANOSOMIASIS IN THE LUSANGA AREA, DISTRICT DUKWANGO, BELGIAN CONGO.

A Report based upon 370 Recorded Cases and 6,200 Intravenous and Intramuscular Injections.

By W. E. Masters, M.D.Brux., L.R.C.P.Lond.

(*Continued from p.* 17.)

The Trypanosome Fever Stage.

Polyadenitis is early and most constant. Only those in the cervical and supra-clavicular region are of significance as of trypanosome origin, as infective skin conditions may cause an enlargement of lymphatic glands elsewhere. The increase in size is from a pin's head to a haricot bean, very rarely to the size of an almond. They are not equal on both sides, either in size or number. They are soft, elastic, movable, and contain trypanosomes more frequently than the blood-stream. The lymphatic system is invaded in 74 per cent. of cases (Bettencourt). Later the glands become hard, fibrosed, and contain no trypanosomes.

Fever was almost always absent in my cases, but when present it is irregular, remittent, and very resistant to quinine. Rigors are rare. It is probably caused by trypanolysis, i.e., the destruction of the parasites by antibodies in the blood. At the onset of the fever the blood has marked trypanolytic power *in vitro* and *in vivo* (Martin and Darré).

Tachycardia is very common and out of all proportion to the degree of fever. The usual rate is 120 to 130, but 140 is not at all uncommon.

Eruptions are common in some districts, but in my thousands of cases I have not seen a typical eruption of any kind in natives. There were two patients who "cast their skins" (*exfoliative dermatitis universalis*) from time to time, and were in consequence called by other natives "nyoka," or snake.

Other workers describe papular, papulo-vesicular eruptions, and circinate patches on the trunk and limbs as described under European symptoms. The eruptions when present last ten to fifteen days.

Blood.—Trypanosomes are very readily found in a thick preparation of fresh blood. I have found three in one field ($\frac{1}{6}$ objective) and ten under one coverslip preparation.

Auto-agglutination is nearly always present and is important for diagnosis. It was first seen in man by Dutton, Todd and Christy.

Anæmia is present but not marked, rarely down to 2,000,000 red cells.

There is a corresponding reduction in hæmoglobin.

Mononuclear leucocytosis is almost constant, coinciding with the lymphatic polyadenitis.

Polyleucocytosis has been observed just prior to death.

An excess of eosinophiles has been noticed by Newham.

The alkalinity of the blood is diminished, probably due to the formation of amido-acids, either secreted by the parasites or produced by their action upon the proteids of the serum.

Nervous disturbances are: Fatigue, asthenia, melancholia, deep hyperæsthesia (rare), exaggeration of the deep reflexes, which are lost later. Romberg's sign is sometimes present. Rigidity occurs in the legs and arms. I had one patient who could not bend his hips or knees. He would dance on his toes for hours at a time without moving from the square foot of ground. When we desired him to lie down he was unable to do so, and had to be put down and picked up by attendants. He died within three weeks from the onset of these symptoms.

Spleen enlargement is slight and may be due to malaria. It is not significant.

Œdema may occur about the trunk in patches or about the face, usually in the sub-orbital region. Albumin in the urine is rare.

Appetite and the digestive functions remain good. Some of my cases preferred burnt clay to rice and maize. This caused intestinal obstruction in one case, from the post-mortem of which I recovered about one kilo of clay in the shape of small balls.

Wasting continues as the disease progresses, but is not present in all cases.

Abortion is common. Menstruation is irregular and may cease. Trypanosomes do not traverse the placental filter.

All babies are born free from the disease.

Duration.—This is variable—one to several years. It is notably shorter in whites than in native races.

Death can take place during this stage from complications.

The Latent Phase.

This often occurs, and lasts from six to eight months before the onset of nervous symptoms. Trypanosomes and auto-agglutination may disappear without treatment. Trypanosomes will appear in the cerebrospinal fluid and grave nervous symptoms will manifest themselves.

The Sleeping Sickness Stage Proper.

Polyadenitis is less marked. The glands become fibrosed and shrunken. They contain but little lymph. Trypanosomes are rarely found in them.

Fever tends to become hectic. Later it becomes subnormal. This is looked upon as a fatal prognosis, and is seen one to two weeks before death.

Tachycardia.—The pulse-rate remains high, and may vary much at different times of the same day.

Œdema may come anywhere, usually about the face and scrotum. The ankles are commonly affected. Some rare cases show anasarca.

Emaciation is progressive and pronounced. Some are like walking skeletons. Some few of my cases have remained particularly fat even to death.

Eye lesions are iritis, cyclitis, iridocyclitis, chorio-retinitis and keratitis punctata, but these were absent in my cases.

One must anticipate eye troubles when one is giving maximum doses of arsenic, apart from eye lesions directly due to the disease. I had one case go partially blind after 0·5 grm. of soamin, and totally blind after 1 grm. of soamin.

Nervous Manifestations.—These are all important and with the wasting form the outstanding features of this stage. They are very variable, and any one patient may only show a few of the many possible.

Debility and languor are accentuated.

Disinclination for work is increasingly marked.

There is a slow, shuffling gait, vacant expression, and indifference to everything and everybody. Tremblings are more marked, there is obvious weakness of the intelligence, in those who ever had any, somnolence, lethargy, asthenia, hyperæsthesia, cephalgia usually suborbital, paralyses, paraplegia or hemiplegia, contractures, epileptiform convulsions, physical disturbances, e.g., mania, mental confusion, loss of memory, incoherent speech, hallucinations, impulses, tendency to theft, homicide, suicide, firing buildings, &c. Delirium may be manifest in the form of depression, melancholia, megalomania, &c. Coma precedes death in most cases.

On the whole the disturbances are cerebral, and not cerebellar or medullary.

Trypanosomes are rarely found in the blood-stream, but are readily found in the cerebrospinal fluid.

Menstruation and sexual desire cease.

Incontinence is common in the late phases.

Duration of this stage is four to eight months, rarely one year when untreated. With treatment it may last one to two years, and in some cases up to four years.

Treatment.

Spontaneous Natural Cure.—There are indications that Nature is operating by attenuating the virulence of the trypanosome, and probably by increasing the resistance of those residing in infected areas, in order to produce spontaneous cures. It is very probable that the chance of recovery is much greater in Europeans than in natives, except in the Rhodesian variety of the disease.

The disease is certainly becoming less virulent in Uganda, an improvement not greatly assisted by the administration of drugs, according to the report of Sir H. Hesketh Bell, who stated that "Drugs have prolonged lives, but there is not a single undoubted cure among thousands of cases that have passed through the camp."

There is no doubt that the majority of untreated cases die, and also that treatment in the last stage is hopeless; in fact, sudden deaths are much more frequent in treated than in untreated cases.

The Application of Drugs.

There is at present no specific remedy for the disease, but the hope that tartar emetic in some form would afford a cure has long been the opinion of Sir Patrick Manson and Sir Leonard Rogers. Some of the information sought by them will, I hope, be found in these notes. Soamin was once extremely popular, but it has now fallen into disfavour, and is disappointing in many cases. It is true that trypanosomes have disappeared after its application in some cases as they have after the administration of Fowler's solution, and patients thus treated have remained free from trypanosomes for years, but one would be inaccurately optimistic to argue from that that such drugs may be expected to cure the disease in most cases, especially now that we know there are some spontaneous cures.

Probably if some stable colloidal form of antimony can be prepared, so that more of the drug can be given without toxic effects, better results would be obtained.

The remedies tried up to the present have been chiefly preparations of arsenic and antimony tartrate.

Salvarsan and its kindred preparations are costly and almost useless. In my opinion, any drug is useless when the cerebrospinal fluid has been infected, as is generally admitted in tabes dorsalis and general paralysis. The reason for this was explained by Professor Halliburton in the *Lancet* of November 4, 1916, when he stated that "the use of salvarsan in locomotor ataxia and similar post-syphilitic affections, via the cerebrospinal fluid, has been abandoned, as it is fatal not only to the syphilitic organisms, but also to the patient. It is further known that salvarsan and its homologues are of little or no use in tabes or general paralysis when it is given in the ordinary channels, for in these latter manifestations of syphilis the baneful spirochæte has got into a harbour of refuge (which we may speak of as extra-vascular) beyond the reach of poison. The stalwart epithelial layer lets none escape, and does not realize how much both doctor and patient would rejoice if it could be made to understand that in this instance at least it did not form such an effective barrier."

It is very doubtful whether the organic arsenical compounds, mercury, trypan red, &c., though they may cause the trypanosomes to disappear from the blood in some instances, will attack the trypanosomes when they are in the cerebrospinal fluid, as these drugs do not pass from the blood to that fluid.

Hence it is fairly conclusive that medicinal treatment administered *per os*, intramuscularly, intravenously or intratheeally, will be ineffective.

Arsenic in certain forms is good in some cases when the disease is in the first stage, i.e., when it is limited to the lymphatics and the peripheral circulation, but even then the trypanosomes may only have passed into a latent endocellular form. Such trypanocidal action as is present with arsenical bodies is due, in the opinion of Mott, to their stimulation of phagocytosis, and possibly to their having an affinity for the phosphorus-containing lipoids of the periplasmic membrane of the organism in question. Other workers claim to have observed the trypanosomes becoming swollen and indistinct after the administration of the drugs. The toxic effects of organic arsenic may be due to its union with the lecithin of the nervous system.

Atoxyl.—A meta-arseno-anilin compound was formerly much used. The recent French preparation is much more toxic than the former German one to such an extent that I have now practically abandoned its use. Bruta da Costa and his colleagues speak well of its use in the Island of Principe, where trypanosomiasis has been "wiped out." They say that "the systematic administration of atoxyl, among other things, has proved a distinct boon to the island as a whole. To this (atoxyl) may be ascribed a fair number of cures, also rendering the suffering when not susceptible to cure as little dangerous to others as possible by causing the disappearance of the parasites from the peripheral circulation." Such, however, has not been the writer's experience.

Soamin.—This is a similar drug to the above, but less toxic. It contains an extra molecule of water. In one of my cases there was optic neuritis after one injection of 0·5 grm., and complete blindness after two injections of 1 grm. in all. This is probably very rare. For details of the results from the use of this drug, see cases tabulated below.

In all but Rhodesian cases, Dr. C. W. Daniels expresses himself as "well satisfied with prolonged use of atoxyl or soamin in doses of 3 to 4 gr. on alternate days," but the writer's experience over hundreds of cases is particularly disappointing.

Fowler's solution has been followed by success in a very few cases, but it is almost useless for universal application.

Atoxylate of mercury is less useful than atoxyl.

Antileutin, a preparation of antimony in $\frac{1}{2}$ to 1 gr. doses, given intramuscularly is too painful for prolonged treatment.

Cacodylate of soda has caused temporary improvement after forty injections. The following remedies are mostly used for mammals and have been found useless in man: Arsacetine, orpiment, arsenophenylglycine, trypanroth, trypasafrol, afridol violet, afridol bleu, parafuchsine, chlorhydrate de parafuchsine, and trypanosan. I have tried mercuric cyanide, colloidal silver, and formaldehyde intravenously without success.

Antimony Tartrate.—The pendulum has now swung from soamin to antimony tartrate, about which Sir Patrick Manson, in the earlier days, and Sir Leonard Rogers recently have been particularly optimistic. In my experience tartar emetic has often proved efficacious in clearing up the symptoms and trypanosomes when all other remedies have failed. Optimism, however, has gone ahead of fact. A writer in the *Lancet* wrote that "the control of trypanosomiasis by antimony and arsenic, given together or in alternation, is as striking in its way as the cure of malaria by quinine." My experience differs vastly from that of the above writer.

Antimony was used in 1907 by Plimmer and Thompson in animals with some success, but present experiments in the Katanga region, where they have *T. brucei* to deal with, demonstrate that animals die sooner if they have antimony treatment than without it. It is probable that so much faith is put into the tartar emetic treatment now because of the high esteem placed upon the words of that Father of Tropical Medicine, Sir Patrick Manson, who said years ago: "I believe that in antimony by the mouth or intravenously we have a promising specific." There is no doubt that tartar emetic does in some cases clear the trypanosomes from the peripheral blood, but probably its penetrating action is insufficient to kill those in the deeper tissues. Tartar emetic disappears quickly from the peripheral circulation, or becomes rapidly transformed locally and excreted.

Sodium bicarbonate is sometimes added to tartar emetic mixtures when given by the mouth (Castellani), in order to diminish the tendency to vomiting, but it is claimed that sodium bicarbonate and sodium carbonate diminish the action and trypanocidal properties of the drug (Van Saceghem and Nicolas). It is doubtful, however, if tartar emetic given by the mouth has any beneficial effect.

Tartaric acid in a 2 per cent. solution has a marked trypanocidal action, and should be given *per os* with tartar emetic when it is administered by the mouth.

Broden and Rodhain (1906-1908) first tried the effect of administering large doses intravenously to natives suffering from sleeping sickness.

Salvarsan and a specific amboceptor by intrathecal injections containing them is suggested as a course of treatment by Levaditi and Mutermilch.

Serum therapy, given intraspinally and intravenously, has been suggested, the serum being taken from a person recovering after chemotherapy. Such lines of treatment, however, are not as a rule successful with protozoal infections.

The writer has for the present decided that the best course of treatment for general application is the combined one, and along these lines most of the later experiments have been carried out.

The doses of the drugs are increased or diminished according to the age and idiosyncrasy of the patient.

The Combined Treatment.

Orally.—The following prescription has proved most useful, though I have not much faith in its trypanocidal action:—

R	Tar. emetic	gr. $\frac{1}{2}$ (0·06 grm.)
	Caffeine	gr. ii (0·12 grm.)
	Tartaric acid	gr. v (0·30 grm.)
	Tinc. opium	♏ v (0·30 c.c.)
	Tinc. nux vom.	♏ v (0·30 c.c.)
	Aq. chlorof. ad.	oz. i (30·00 grm.)

One ounce is given thrice daily in plenty of water, the dose increased if possible.

The tartar emetic is given for its trypanocidal action; caffeine to counteract the depressing action of the above; tartaric acid to increase the trypanocidal action of the tartar emetic; the tincture of opium to allay gastric disturbance and vomiting; the tincture of nux vomica as a general muscular tonic. Sodium bicarbonate, when added instead of tincture of opium, reduced the trypanocidal action of the drug.

Intramuscularly.—Soamin, 0·25 to 0·77 grm. is given every five days.

Tartar emetic, as suggested by Castellani, is always painful, and, in the writer's opinion, its local action upon the blood-vessels, like that of quinine, does not favour rapid absorption.

Intravenously.—A 2 per cent. solution of tartar emetic is prepared.

A 20-c.c. Record syringe is used with a rubber connecting tube. The dose given is 4 to 12 c.c. of the above solution, increased from the lower to the higher by 1 c.c. each injection until toxic symptoms arise; the dose is then lowered 1 c.c., and kept at that, which is called the maximum dose for that patient. The injections are given every other day. A solution of hot boiled saline or plain water is prepared. A tourniquet is applied, usually upon the upper arm, and tincture of iodine is painted over the distended vein. The required amount of the 2 per cent. tartar emetic solution is drawn into the syringe, which is then filled up to 20 c.c. with the hot boiled water. The air is expelled, an assistant holds the syringe, the vein is pierced with the needle only, and when the blood flows freely the syringe with its flexible tube is attached and the contents injected.

The point of the needle is pressed upon by an iodine swad on a rod while the needle is being withdrawn. If the piston end of the syringe is elevated during the injection, the air, if any is present, remains behind. One c.c. of the fluid is left in the syringe, which is expelled after the needle is withdrawn in order to flush out the needle. If before the injection is finished a troublesome cough appears or vomiting threatenes the needle is withdrawn. The patients are given one week's rest after five weeks' treatment.

Summarized notes on Lazaret cases:—

Admitted to Lazaret	370 cases
Injections, intramuscularly, ...	4,600
,, intravenously, ...	1,600
	6,200 in all

Of the 370 admitted, 160 died or absconded before having received three injections, and are excluded in the cases recorded above.

Of the 216 recorded cases as above the results were as follows:—

Recovered. No trypanosomes found on repeated examination ...	... 8	3·9	per cent.
Improved, but trypanosomes ...	... 60	27·9	,,
Unimproved	... 42	19·4	,,
Died	... 81	37·3	,,
Still under treatment, but trypanosomes still found	... 25	11·7	,,
	216	100·0	,,

The terminal phases of fatal cases were:—

Exhaustion	57
Dysentery and diarrhœa	12
Heart failure	6
Meningitis	3
Pneumonia	2
Peritonitis from intestinal obstruction due to geophagia	1
	81

The commonest symptoms were:—

Wasting the most common, in 65 cases.		Œdema in 15 cases	
Tremors common in	18 ,,	Ataxia in	15 ,,
Mania and dementia in	14 ,,	Fever in	2 ,,

Eye symptoms were seldom if ever present.

The cases recorded above were diagnosed as being in the last stage of the disease, except the last group still under treatment.

Nearly all the cases admitted were young adults and mostly males. It is not to be inferred from this that males were infected more frequently than females; the fact is explained by our having received the young adult males from our staff of native workmen. All those treated were volunteers and were allowed to go when they pleased. The Government gives the authority to detain them, but it does not provide any means for carrying it out. The country is too vast, the infection too extensive, and the people are in a too primitive condition to gain much by isolating them. Because of the liberty given to the patient of leaving when they pleased we could not examine those for trypanosomes who absconded, but our experience causes us to assume that trypanosomes were still present in the majority of cases.

Realizing that curative treatment was hopeless for those in the last or sleeping sickness stage of the disease, I turned my attention to the treatment of those in the first, or so-called, trypanosome fever stage. I had already been giving large doses of soamin when touring amongst the natives, but the attempt to sterilize the peripheral blood in this way was hopeless. Not only so, but the natives "cleared" into the bush as soon as the "monganga" (doctor) and his needle were about. Salvarsan and its kindred preparations have also failed in my hands, but Dr. Van den Branden of Leopoldville, Belgian Congo, writes more optimistically as follows:—

STERILIZATION.

"A single dose of the drugs enumerated below may lead to definite cure, and in most cases the blood is rendered sterile for some months. The patients were in good condition, with normal cerebrospinal fluid.

"(1) A single dose of salvarsan, 0·1 grm. per kilo of weight, produced in four patients blood sterilization lasting 2, 7, 7 and 8 months.

"(2) A single dose of neosalvarsan, 0·13 grm. per kilo; no relapse after 4, 8, 12 and 22 months.

"(3) Salvarsan copper, in doses of 0·4 grm. per kilo in weight, produced sterilization for 19, 23, 23 and 24 months.

"(4) The sodium salt of salvarsan copper, 0·53 grm. per kilo of weight, produced sterilization for the period of 8, 8, 12 and 12 months."

The rapid relapses are not dealt with.

Dr. Van den Branden recommends the four substances for use in tours for the treatment of sleeping sickness taken at intervals of months. This course of treatment is certainly very costly.

I attempted to clear the trypanosomes from the peripheral circulation by my combined medication already described. As no natives will apply for treatment while in the first stage of disease, twenty-two volunteers were paid to undergo the treatment. They were all apparently healthy male adults, and were at work prior to the treatment. All showed trypanosomes readily in a fresh blood film and had the ordinary enlarged glands. The period of treatment was six weeks. The greatest possible amounts of the drugs were given in each case. All lost over 2 lb. in weight during the experiment, but this could be regained, and could be accounted for by the gastric unrest and nausea caused by the tartar emetic and the soamin. My attempt was to ascertain the quantity of the drugs required to kill off the trypanosomes that were so abundant in the peripheral circulation, so that if the blood-stream could be kept clear of them there would be evidence of the likelihood of a cure by this treatment.

The results were as follows:—

				Glands	Trypan.	Auto-agg.	Tartar emetic, vein	Tartar emetic per os	Soamin and atoxyl		
1	M.	...	26	... XX	... 2	... XX	3·03	... 2·36	... 4·88	... No trypanosomes found.	Auto. agglu. —
2	M.	...	26	... X	... 7	... —	2·94	... 2·35	... 4·85	... One ,, ,,	,, ,, —
3	M.	...	24	... X	... 10	... X	2·42	... 2·36	... 4·85	... Two ,, ,,	,, ,, X
4	M.	...	22	... XXX	... 3	... XX	1·82	... 1·65	... 1·54	... Two ,, ,,	,, ,, —
5	M.	...	22	... X	... 1	... XX	2·42	... 2·36	... 4·85	... No ,, ,,	,, ,, —
6	M.	...	24	... —	... 5	... XX	2·50	... 2·18	... 4·85	... One ,, ,,	,, ,, —
7	M.	...	24	... XXX	... 1	... X	3·08	... 2·18	... 4·08	... No ,, ,,	,, ,, —
8	M.	...	22	... X	... 4	... X	2·74	... 2·36	... 4·08	... Five ,, ,,	,, ,, —
9	M.	...	22	... X	... 2	... XX	2·56	... 2·36	... 4·08	... Two ,, ,,	,, ,, X
10	M.	...	20	... XX	... 1	... —	2·66	... 2·36	... 4·08	... One ,, ,,	,, ,, X
11	M.	...	24	... X	... 1	... XX	2·66	... 2·36	... 4·85	... Three ,, ,,	,, ,, XXX
12	M.	...	18	... X	... 2	... XX	1·22	... 0·90	... 1·54	... No ,, ,,	,, ,, —
13	M.	...	14	... XX	... XX	... XX	0·94	... 3·00	... 3·66	... No ,, ,,	,, ,, XX
14	M.	...	12	... XXX	... —	... —	1·32	... 1·36	... 3·83	... No ,, ,,	,, ,, XX
15	M.	...	12	... XX	... X	... XX	1·80	... 0·32	... 4·60	... No ,, ,,	,, ,, X
16	M.	...	25	... X	... 2	... XX	1·92	... 1·30	... 4·85	... No ,, ,,	,, ,, —
17	M.	...	25	... XX	... X	... X	2·90	... 7·70	... 8·00	... No ,, ,,	,, ,, XXX
18	M.	...	26	... X	... XX	... XX	3·00	... 5·89	... 4·60	... No ,, ,,	,, ,, XXX
19	M.	...	15	... XX	... —	... —	1·30	... 1·20	... 3·16	... No ,, ,,	,, ,, —
20	M.	...	28	... XXX	... XX	... X	3·88	... 4·90	... 6·93	... Some ,, ,,	,, ,, X
21	M.	...	22	... X	... XX	... XXX	4·68	... 4·60	... 9·61	... No ,, ,,	,, ,, —
22	M.	...	22	... XX	... XX	... XX	1·08	... 1·00	... 2·31	... No ,, ,,	,, ,, —

A few of the latter cases were under treatment for a longer period. Such cases as No. 22 show that the treatment is by no means a specific. Nos. 14 and 19 are not significant, as trypanosomes were not found in these cases. Where no trypanosomes were found on the first examination, a second was always carried out a few days later.

The results were as follows:—

Cases that did not show any trypanosomes	12 or	54 per cent.
Cases showing fewer trypanosomes and some general improvement	5 or	23 ,,
Cases showing no improvement	5 or	23 ,,
Cases the worse for treatment	nil.	
	22 or	100 per cent.

Cases Nos. 14 and 19 were included to see if the treatment would bring trypanosomes into the peripheral circulation.

It would not have been possible to have given a larger quantity of the drugs in the time under treatment.

The patients are to undergo monthly examinations for trypanosomes to see how long they will remain free from them.

As far as I know this combination of drugs has not been given elsewhere, at least I have not been able to secure any records of such.

One has to acknowledge that some of the twelve cases quite free from signs and symptoms of the disease may relapse, but, on the other hand, if the treatment had been continued for two years, as in England, instead of six weeks, probably more of the remaining ten cases would have cleared up also. While the results are encouraging, better could be obtained if less toxic preparations of tartar emetic could be obtained, so that larger quantities could be given without toxic effects.

In going over my European cases the results are not more discouraging. These were given similar treatment to the natives mentioned above. The cases were as follows:—

(1) Monsieur V. Trypanosomes found at the end of 1915. Treated here. Now he returned from Europe as free from all signs and symptoms of the disease. He did not receive any anti-trypanosome treatment in England to my knowledge.

(2) Monsieur M. Trypanosomes found at the same time as the above. Treated here; chiefly soamin. He has not left the country, but he remains in a good state of health.

(3) Mr. S. Manifested nearly all the signs and symptoms possible. Treated here for months, and all the troubles cleared up except some leg pains. He is now undergoing treatment in London to make doubly sure. No trypanosomes have been found in this case either here or in London, although the London authorities agreed in the diagnosis.

(3) Monsieur T. Diagnosed by me. Refused treatment and sent to Europe. He has been under treatment at home for more than eighteen months already.

(5) Monsieur K. Diagnosed by me here. Patient refused treatment. He died before he could leave the country.

The first three cases are too few in number to make one dogmatic about any method of treatment, but they gave good results.

Conclusions.

(1) The symptomatology differs considerably in white and coloured races during the first or so-called trypanosome fever stage of the disease.

(2) The symptoms are manifested earlier in white races, and hence, as treatment is commenced earlier, there are greater chances of cure.

(3) Spontaneous cases of cure are known to occur after a definite infection of the disease.

(4) There are many "carriers" of the trypanosomes: People who do not manifest any apparent inconvenience from the parasites, but who are a source of great danger to others.

(5) There is no specific drug for the disease.

(6) The last, or sleeping sickness, stage probably is and always will be incurable, no matter what drugs may be used. When the spirochæte of syphilis has taken up its permanent abode in the brain and spinal cord the incurable diseases of general paralysis and tabes dorsalis ensue. No drugs given by the mouth, muscle or vein can reach the brain or cord. Drugs given directly into the spinal cord do more damage to essential tissues than to the parasites, and hence are ineffective.

(7) When cases in the sleeping sickness stage do not respond after a short period of treatment they should be isolated, if practicable, and put into an asylum to die in cleanliness and some degree of comfort.

(8) Treatment in this last stage often causes sudden death, which is not so frequently met with in untreated cases.

(9) In the first, or trypanosome fever stage, the best results obtained and published are, as far as one can ascertain here, those resulting from the combined drug treatment as adopted and described in this paper.

(10) Experiments over longer periods with frequent examinations over months and years after cessation of treatment will alone enable one to make dogmatic statements about the efficacy of any mode of treatment.

(11) Soamin given alone is almost useless. So very few cases have been freed from trypanosomes by it that it would be difficult to separate them from spontaneous cures.

(12) A less toxic form of tartar emetic is needed, such as a stable form of colloidol antimony. Such may probably give better results still. In any case the treatment may be shortened and made more pleasant for the patient. It is claimed that such a preparation has been made at Crooke's Laboratory, but I have not yet been able to obtain any of it.

(13) In spite of the good results obtained above, I am still of the conviction that the treatment of this disease is impracticable in a country so vast and with an infection so extensive as this. No native workers, no matter how skilled, could ever give intravenous injections en route to deal with the malady. Treatment must remain for selected cases only.

Prevention is the only road to eradicate the disease, i.e., the people brought into large villages, extensive clearings carried out, large plantations made and maintained, and the whole under the constant control of an European medical officer. Then a new non-infected race would arise, the sporadic cases would be isolated at once and treated, and a healthy stock would provide workmen for all.

Pneumonic plague is spreading to an alarming extent along the confines of Mongolia and North-West China.

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THE ATTEMPT TO NATIONALIZE THE MEDICAL PROFESSION.

(A Review of the Possible Changes such a Step might Involve.)

It is whispered in more than one quarter that an attempt, supported by high authority, is to be made to nationalize the medical profession. Nay, more, it is stated with every assertion of surety that

the scheme is already in being wherein this end is set forth and its machinery arranged. The proposal is one which affects both the people and the medical profession to a degree that any light-hearted deviser may not have anticipated. In attempting to consider so important a scheme it is only natural to inquire whether or no there is any experience to go by in a matter of the kind, as to the good or bad effects which may accrue should Government decide to take so serious a step.

What is meant by this nationalizing? If it means anything, it surely implies making the whole medical profession a State service. Every qualified medical man (and woman we presume) is to become a servant of the State in the same way as in other State departments. We have examples of this in the Navy and in the Army, in the Colonial Medical Service in a modified degree, and in a still more modified form in the Department of the Public Health Service with its medical officers of health, the Poor Law Department, the Department of Lunacy, the Prisons Medical Service and a few others. It may be naturally asked: Are these departments failures or successes, are the medical men employed content, is the service impaired by their being under State or (at times) municipal or local authority control? In what way do they differ from the practitioner of medicine who is free to conduct his practice as he pleases, to pick and choose his patients, to practise medicine or surgery or any of the specialities as he feels inclined or has a desire for, and to raise or lower his fees as he wishes? He can shift his field of work, go from one street to another, from town to town, leave the country and take up practice in town or *vice versâ*. He can emigrate to another country inside or outside the Empire, and retire when it suits himself. He is, in fact, a free agent as to where he is to go and how he is to live and have his being. It is not so in any State or other controlled department. In the Public Service he has to go where he is sent, to take up the work allotted to him, to wear what uniform he is commanded to don, to take his holiday or not take a holiday at all as it seemeth good for the authorities. To report all his doings, his cases, his prescriptions, the expenditure made in his department, the reasons for his prescribing this or that diet, medicine, and all the seeming trivialities incident to medical practice. In other words, one man is free to follow his own ideas and inclinations, whilst the public servant is bound by regulations which call for a renunciation of his individuality at the behest of a superior authority.

The financial outlook of the State-controlled employee and of the self-controlled practitioner is widely different. On entering a State service there is practically no initial expenditure, but in ordinary practice it is a different matter. The private practitioner may, and often has to buy a practice or a share in one; he has to take a house, furnish it, purchase his instruments, and it may be a motor car or carriage. If he sets up "on his own" he has to have the capital to tide him over the time until the practice brings sufficient income to meet expenses. The struggle for a livelihood continues through life, when his savings may or may not justify his retiring as the seventies approach. As a rule the amount he saves is a meagre amount, and if he can sell his practice for several hundred or even a thousand pounds he is lucky.

With a State-employed medical man, he steps into his post with a low salary it is true, but the money is sure, the expenses of practice are *nil*, he has not to occupy a house in a "good neighbourhood," and has neither rent nor rates to pay. There are no bad debts. As years go on his pay increases mechanically, and he looks forward to a pension. His income does not depend on his skill in either medicine or surgery, but on his performing a routine of work efficiently and systematically. Ambition has little or no scope, ability little chance of showing itself and is most likely stifled and discouraged in high quarters. He becomes, as mature years are reached, all too often a machine, sans ambition, sans originality, sans desire, sans everything that adds a zest to life and makes life other than a clock-like round of work and routine. Brilliant exceptions there are, especially in the Army of to-day, which has given us such men as Ronald Ross, Leishman, David Bruce and Leonard Rogers, and in other spheres Crichton-Browne, George Newman and others. Nationalize the whole profession and what will happen? An easier life for the medical man as a whole, no bad debts, no legitimate expenses that are not defrayed by the State, no occasion to run into debt, and old age provided for by a pension, be it meagre, yet it would be sufficient to relieve anxiety from want. What is given up for these benefits? The stimulus of ambition, of success, of work for work's sake, a great deal of the scientific interest in his profession, and the zest which is attached to "getting on."

Nationalizing means also specializing. The laboratory worker will remain the laboratory worker through life, a being apart from the practice of medicine. Thus told off by authorities, clinical work is forgotten; he devotes himself to research, to purely scientific investigation; disease in its clinical form is neglected, unseen and unknown, and there arises that most dangerous of situations, a loss of touch and divorce between the clinical and the laboratory work, to the detriment of both the men engaged in the work and the public good.

The Case of the Public.

To the official doctor the patient becomes an official patient. He is no longer "my own doctor," but behind him there is officialdom which tinges the relationship and lessens the possibility of the same friendliness. The intimate life, the "secrets" of family relationship, the "contracted" disease unconfessed because of the dread of its being recorded officially, leading to ruin of domestic happiness, and the thousand and one things that the doctor is, and can be, to the family is at end, and

" my own doctor " is no longer their helpful friend, but an official told off to treat disease.

This phase of change and its consequence have been seen to a most regrettable extent at many medical boards examining for the Army. The civil doctor called from his home, his practice, his " own patients," is suddenly enrolled, dressed in uniform and given the rank of officer. He becomes evidently, in almost every case, a changed being; no longer the servant of the public, he becomes their master. Other practitioners are despised civilians; their word, their position, is anathema, and their reports of cases are —— impudence. It is useless to pursue this story further, for it is public property. It will take fifty years for the profession to recover its position in public opinion. The behaviour of these medical men brought the position of the profession before the House of Commons, and to save the good name of the R.A.M.C. these men had to be stripped of their uniform and continue work as civilians. Is this to be the effect of nationalizing the profession? Is this heartless machine to take the place of the family doctor? God forbid! for it will add to the materialism which saps our being and throws us into the sphere of " Kultur " with its hideousness and barbarity.

The intended nationalization has really no corresponding equivalent in existence to judge by; treating the soldier and the sailor on service, the poor in the infirmary, the lunatics in our asylums, is not family practice in any sense of the word. There is no past experience to judge by as to what the effect of making all doctors officials of the State will be. It is a form of militarism in medicine which is foreign to a " social " state of things. The mother will require another confidant to whom to tell her woes and her doubts and from whom she can get advice. Who is that to be, the pastor or the priest, the police or the monthly nurse? " Her own doctor " is no more, and no other man or woman can supply his place. The result of nationalization would seem to be that the majority of doctors will benefit in freedom from anxiety, by being more independent of public opinion, by a lessening of expense, by less dread of old age being unprovided for. The profession of medicine as a science and an art will in the main suffer by the divorce between specialism and practice, by the absence of the driving force of ambition amongst its members, and by a loss of freedom to pursue a particular course which is the spur to emulation, to success, and a high state of efficiency.

As far as the public are concerned their present relationship to their doctor will be at an end; he becomes not the family doctor, but an official inspector and reporter of disease, having a disregard of family affairs in his duty to his masters. An excellent machine it may be, but a heartless one; no longer " my own doctor," but one who has to perform his duty to the State; a friend no more, but a spy upon disease.

The above dissertation, let us hope, is wrong in every detail, its conclusions false, and its statements absurd. We cannot conceive such a state of affairs. Surely State Socialism is not to lead us to a world of machine-made doctors. Let us hope better things are to come out of it, and that the souls of medical men may not be rendered less human by its advent.

Annotations.

Acclimatization to the Tropical Sun (The Journal of the American Medical Association, October 27).—Although our knowledge of the regulation of body temperature and its relation to metabolism has reached a stage at which an intelligent appreciation of many of the factors involved can be formulated, there are features of the heat-controlling mechanism that still demand elucidation. In several respects the climatic conditions that prevail in the Tropics have furnished greater obstacles to the comfort of man than have the severe rigors of arctic surroundings. The problems of climatology in the Tropics have become emphasized by the growing necessity of the white man's residing there and adjusting himself to the situations created by wind and weather. By some writers, tropical sunlight has been endowed with properties peculiarly detrimental to human health and comfort. The effect of the ultra-violet rays on the skin in the familiar production of the inflammation called sunburn, erythema solare, is not directly associated with heat. Indeed, it is often said to be more likely to occur in colder surroundings, owing, in part perhaps, to the fact that the heat of the sun's rays is not noticed, so that means are not taken to protect the skin to the same extent from their action.

Several years ago Aron, then professor of physiology in the College of Medicine and Surgery at Manila, reported an almost surprising series of observations. The monkey is susceptible to harm from direct exposure to the sun in the Philippines; it dies in many cases in from seventy to eighty minutes when placed on the ground in the Manila sun, even in the coolest months of the year. Unacclimatized Philippine monkeys exposed to the sun in Manila may die of heat stroke in the course of a very short time, depending on conditions.

Factors that must be taken into account in any attempt to determine the cause of a rise in body temperature or of death following exposure to the sun are the energy of the solar rays, and the temperature, the movement, and the humidity of the air. Shaklee finds by direct observations that the conditions making for a rapid death are a hot sun; proximity of a large hot surface, such as the ground or a roof; high relative humidity of the atmosphere, and a low wind velocity. Under such circumstances death is due to an accumulation of heat in the body.

But monkeys can apparently be acclimatized to the conditions mentioned, if exposure to them is gradual. This is of signal importance in relation to the comparable possibilities in the case of man; for the human organism seems in many ways far

better adapted than the monkey's to resist the tropical climate. The temperature-regulating mechanism in man is much more sensitive than that in the monkey, as shown by the smallness of the normal variation of the body temperature in man as compared with that in the monkey. The sweating mechanism in man has many times the capacity of that in the monkey, and as the temperature of the surrounding atmosphere approaches the temperature of the body, this becomes the most important means of eliminating heat from the body. The internal heat production of man on a light diet is smaller in proportion to body surface than that of the monkeys subjected to this experiment. Man stands higher above the hot surface on which he rests or moves; hence he would receive less heat from the ground and be subjected to a more rapid movement of air over the body surface than would the monkey. Man's body has much less hair than the monkey's; hence the escape of heat from his body by radiation, conduction, or evaporation is less interfered with. Man can so select and arrange his clothing that it will interfere little with the escape of heat from his body, while at the same time it will shield the body from the heat rays coming from the sun. Moreover, man is acquainted with a larger variety of foods.

The acclimatization to the tropical climate as experimentally accomplished in the case of the monkey appears to be due esentially to an increase in the sensitiveness of the nervous mechanism that regulates body temperature. This results in an increase in the rate or efficiency of sweating, producing what has perhaps falsely been termed an immunity. The "immunity" is readily lost if the subjects are kept in the shade. In harmony with the explanation advanced above is the fact that a small dose of atropin, which diminishes the action of the sweat glands, as well as other secretory structures, suffices to nullify the effect of any acclimatization and to cause the death of an acclimatized animal by stopping perspiration. The inference is further supported by the fact that when the relative humidity of the atmosphere is great, even acclimatized animals exhibit a tendency to a markedly greater rise in body temperature. Finally, attempts to acclimatize rabbits—a species not known to perspire—have thus far entirely failed.

Evidence has begun to accumulate that healthy white men may be readily acclimatized to the tropical climate at its worst. The amount of sweating necessary to keep the body temperature of a healthy white man from rising above normal is not excessive, even when the man is doing considerable physical work in the midday sun in such a tropical climate as that of Manila, provided the man has been sufficiently long on a suitable diet and introduces himself gradually into the work in the sun. In the acclimatization of the white man the most important factor is the proper regulation of the diet. The effects from the tropical sun seem to be exactly the same as the effects from the sun elsewhere—that is, no effects are seen or felt that are different from what would have been expected under like circumstances in a northern country.

Rectal Crises of Non-tabetic Origin (A. MacLennan, *Glasgow Medical Journal*, lxxxviii, September).—Both sexes are liable to these attacks, though they occur more frequently in males. It has been observed in ages ranging from 16 to 50. The pain complained of is of the most commanding character; it is located in the sacral region. Tender areas are not associated with the deep-seated pain, but, on the contrary, pressure tends rather to give relief. The crisis commonly arises during defecation, especially if accompanied by straining. On the other hand, the patient may be wakened from a sound sleep by the rapidly growing pain. Tenesmus is present, and the act of defecation, though at first it causes an exacerbation of the suffering, results in its cessation. In men the crisis may be accompanied by priapism. When the crisis has reached its zenith the onset of a general tremor or rigor, accompanied by the sensation of cold, is almost invariably followed by a rapid cessation of the pain. The pain may wax and wane, but the most severe attacks are often the shortest. Examination of the rectum during the attack has demonstrated in two cases the presence of a fine fibrillar tremor in the internal sphincter. Piles may be present and undoubtedly enter into the etiology. A severe type of rectal crisis was recently observed after colostomy in a case of inoperable cancer of the rectum. The lesion is a neurosis. In no case examined during the pain has the rectum been found quite empty, and constipation of a minor degree has been the rule. The most efficacious treatment is the inhalation of a dozen drops of chloroform placed on a handkerchief.

Abstract.

AN EPIZOOTIC OF POLIOMYELITIS AMONG DOGS.[1]

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AND
W. L. JOHNSON, D.V.S.

PARALYTIC affections of dogs, commonly of sporadic occurrence, have been frequently noted, and the occasional paralysis in connection with canine distemper is well known. But so far as we are aware there have been no reported outbreaks in which the central nervous system lesions corresponded with those observed in human poliomyelitis.

Therefore the small epizootic which we report is, it is believed, unique in this respect, as the descriptions and photographs show lesions which must be regarded as entirely similar to those found in connection with human poliomyelitis.

In the course of his practice in Jamaica, which,

[1] Abstracted from *Medical Record*, November 17, 1917.

although a part of the greater city of New York, is in all respects similar to a country town of a few thousand inhabitants, Dr. Johnson was called in the early part of March last to see a two-year-old collie dog (the property of a family by the name of Keller) which he found suffering from fever and paraplegia. This dog, after being under observation a week, was chloroformed.

The next case that came under his care was the Gibbs dog, also a collie of like age, and which was affected in the same manner as the Keller dog. This dog lived for ten weeks.

About April 15 the first Ostrander dog came under observation. This dog was an adult female collie of two and a half years, with a six-months-old pup. The owner reported that the dog, just previous to the paralysis, had shown some indisposition and a slight cough. When seen, the dog suffered from fever and paraplegia. Two weeks later, when the paralysis appeared to involve partially the left paw, the bladder and bowels, the dog was chloroformed and autopsied.

Two weeks after the death of this last dog her six-months-old puppy developed similar symptoms and, with the consent of the owner, was removed by the authors and kept under close observation. When removed, this dog had a temperature of 102° F., and showed paraplegia and partial involvement of the front leg muscles and paralysis (at least partial) of bowels and bladder. It had been ill two weeks.

While under observation an attempt was made to introduce, intraspinally, blood serum from another dog, but whenever the needle seemed to reach the spinal canal nothing but a little blood (2-4 c.c.) came out, and as it was feared that a vein and not the canal had been reached no serum was administered in this way. Sixty cubic centimetres were, however, given intravenously without apparent effect. The dog soon began to show great difficulty in eating (it had to be fed milk from a cup), apparently having a partial paralysis of the throat and tongue muscles. It also developed a whining cry which became almost continuous, especially at night. It was chloroformed after having been under observation fifteen days.

On May 1 a three-year-old collie (the McCormack dog) came under observation. It manifested fever and complete paraplegia. This dog, the owner stated, had never been off his premises except on a leash. The owner's wife said she thought the dog had contracted his disease from her, since she had just previously suffered from a severe pharyngitis, and had fondled the animal a great deal. This dog was nursed for a while and then destroyed.

On May 10 the Robbins dog, a two-year-old mongrel, developed fever and paraplegia, and was chloroformed a few days later.

On May 15 the Molius dog, a four-year-old mongrel, showed the same symptoms, and was likewise chloroformed.

All of the above animals, except the Robbins dog, lived within distances which would have allowed contact, although there was no history of such. Of course, the collie mother and her pup were in intimate contact (in the Ostrander household). In this last family there was an adult male collie, the sire of the pup, that escaped without sign of illness.

The above seven dogs were all that came under direct observation, but several others, evidently paralysed, were seen in yards, and still others were reported to be suffering from the condition.[1]

During the extensive prevalence of poliomyelitis among the human population in this city in 1916, Dr. Johnson did not note any similar cases among the canine pets of Jamaica.

Pathology of Cases.—The first autopsy was performed on the adult Ostrander dog, immediately after it was chloroformed. The meninges and superficial vessels of cord and brain appeared congested and the grey matter of the cerebrum softer than normal. Sections of the cord showed perivascular infiltration with leucocytes, which was particularly marked in the grey matter. Some of the nerve cells of the anterior columns could be seen (under high magnification) to be degenerated.

Autopsy on the puppy of the above showed intense congestion of the superficial vessels of brain and upper cord. Some of the superficial vessels of the cerebrum had given rise to a number of small hæmorrhages, while the lumbar cord was purple, evidently from hæmorrhagic extravasations which had taken place into its substance. Autopsy on the Molius dog showed slight congestion of superficial vessels of brain and cord. Sections of the cord of this dog showed very markedly the perivascular infiltration and grey matter involvement so typical of human poliomyelitis.

Bacteriology.—From cords and brains of all three animals a usually Gram-negative, pleomorphic bacillus was isolated—in pure culture from the first and the third. From the second a Gram-positive coccus was also obtained. This latter was later proved not to be what we may call a "fixed" coccus since, on extended cultivation, it developed into the bacillus described.

A young dog inoculated intravenously with 0·25 c.c. of a fluid culture (serum-bouillon-lime-water) of the pleomorphic bacillus, repeated on each of four successive days, developed the typical symptoms (paraplegia and fever) and lesions.

The shape of the bacillus varies greatly from a short coccus-like form to a bipolar bacillus. When the poles are well developed they are Gram-positive. The organism is motile and has a single flagellum.

The organism will grow for generations on solidified Loeffler's blood serum, as a Gram-negative pleomorphic bacillus. It, however, tends to develop into a bipolarly Gram-positive bacillus which, when vigorous growth has been attained, will liquefy the

[1] The number of collies attacked in this series recalls the epidemic, apparently of poliomyelitis, reported among Esquimo dogs, very near relatives of the collies, by Pierson (*J.A.M.A.*, Feb. 28, 1914). This may indicate a greater susceptibility of these dogs to the specific paralysis.

solidified serum, at the same time showing as an involuted form from which the polar bodies break out.

It may be grown on plain nutrient agar and in bouillon, but replants from one medium to another often fail.

LIVINGSTONE COLLEGE.

Since August, 1915, the College has been used as a hospital for wounded soldiers. It would be premature to attempt any detailed forecast of the programme which may be attempted when the College becomes once more a school for the training in the elements of medicine, surgery, and hygiene. Reconstruction, however, is one of the burning topics of the day. Not only Livingstone College but most other institutions for the training of men are temporarily in abeyance, and it is none too soon to consider plans for the preparation of the missionaries of the future.

One of the great lessons of the War has been the importance of the Medical Services, and the future should see a great development of medical missions under the leadership of qualified doctors and nurses.

Another lesson to be learned from the War is the large part which may be taken by men and women with only an elementary medical training in ministering to the sick and suffering. V.A.D. nurses have proved themselves of the utmost value in many spheres, and several reports have cordially referred to the splendid service which they have rendered at Livingstone College Hospital. The same is true of the R.A.M.C. orderlies, who have been drawn, in a large number of cases, from those who have attended classes under the St. John Ambulance or Red Cross Society. Many of these have been trained in military hospitals, and members of the College staff now holding temporary commissions have taken part in the training of these orderlies.

With this object-lesson before them, missionary leaders should be led anew to recognize the importance of elementary medical training such as Livingstone College can afford; but on account of the demands which are being made for specialized training of the missionary, there is serious danger that the necessity of instruction in elementary medical subjects may be overlooked.

We believe that, as a result of our experiences of the War, a great impulse will be given to the work of Livingstone College, and that some of those who have been serving the sick and wounded in the War may themselves desire to continue to use their gifts in similar work in the mission field, for which they may seek further training at Livingstone College.

Notes and News.

THE PRODUCTION AND USES OF RICE.

It is calculated that the output of cleaned rice in 1916-17, in all countries except China, amounted to about 60,000,000 tons. Of this the British Empire produced about 36,000,000 tons, mostly in India, where the crop (including an allowance of a million tons for native States) was no less than 35,000,000 tons. Of the foreign production of 24,000,000 tons over 20,000,000 tons were grown in five countries —Japan, Netherlands East Indies (chiefly Java), French Indo-China, Siam, and Korea. It is estimated that China produces as much as India, each providing about 40 per cent. of the world's rice.

The world's export trade in rice is practically under the control of three countries, India, French Indo-China, and Siam. It has been calculated that the quantity of rice which entered into international trade, as shown by the export returns of different countries, amounted in 1913 to about 6,400,000 tons. This includes exports from European countries of rice which has been milled in those countries, which came originally from India, Siam, or Indo-China, and which unduly swells the total by being counted twice over. Even so, the original exports of rice from India amounted to 40 per cent. of the total, while those from Indo-China were 20 per cent., and those from Siam 18 per cent.; in other words, these three countries provided nearly four-fifths of the total.

India's export trade in rice is really dependent on Burma. Not only does Burma provide about three-fourths of the exports of rice from India as a whole (1,835,000 tons out of 2,420,000 tons in 1913-14), but Burma usually sends to other provinces of India more rice than those other provinces export. Without Burma, India would not be self-supporting in rice. As it is, India's exports of rice in the year before the War were equal to the gross requirements of the rest of the Empire, though actually only 42·6 per cent. of the exports went to British countries, and 57·4 per cent. to foreign countries.

The exports direct to the United Kingdom were only between 6 and 7 per cent. of the total. On the other hand, the United Kingdom imported considerable quantities of rice from Holland and Germany which had been first exported from India to those countries, and after being milled and polished there had been re-exported to the United Kingdom.

Rice-milling, at one time a flourishing industry in the United Kingdom, had declined before the War owing to severe competition from the Dutch and German mills, with the result that not only was the British home market partly supplied by foreign-milled rice, but what was at one time the considerable British export trade in fully-milled rice had been reduced in many directions. Since the War both the home and export trade in milled rice has been largely recovered by the British rice-millers, and it is hoped that this industry and trade may be retained after the War.

The value of rice meal as a feeding-stuff for live-stock plays an important part in the value of rice. The Indian Committee of the Imperial Institute is now conducting, at the request of the Secretary of State for India, an inquiry into the possibility of increasing the use of Indian raw materials and food-stuffs within the Empire.—*The Bulletin of the Imperial Institute.*

Original Communications.

CASTELLANI'S ABSORPTION TEST: ITS TECHNIQUE AND APPLICATIONS.

By FRANK E. TAYLOR, M.D., M.Sc., M.R.C.P., F.R.C.S., D.P.H.

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CASTELLANI'S saturation or absorption method has recently begun to be extensively used both in European and American laboratories. As the method is also of much assistance in the investigation and diagnosis of certain tropical infections, a short résumé of it—based on my own experience and that of other workers—will probably be found acceptable to medical men practising in the Tropics. I shall be as brief as possible, as I propose publishing shortly a full and detailed paper on the subject in a journal solely devoted to pathology.

In 1901 Castellani discovered (*Zeit. für Hygiene*, 1902) that in rabbits immunized for typhoid only, whose serum agglutinated not only the typhoid bacillus, but also certain strains of *B. coli*, saturation with an excess of typhoid bacilli would remove not only the specific (primary homologous) typhoid agglutinin, but also the non-specific (secondary, coagglutinin, hetero-agglutinin) coli agglutinin, while the saturation of the same serum with *B. coli* removed the coli agglutinin (non-specific) but not the typhoid agglutinin (specific), or only a very slight amount of it; and in a serum derived from rabbits immunized for typhoid and colon bacilli, neither saturation with *B. typhoid* alone, nor *B. coli* alone, but only both together, either simultaneously or successively, would remove the whole of the typhoid and coli agglutinins present in the serum.

Castellani's work has been abundantly confirmed and extended by the researches of Boycott, Bambridge, O'Brien, Gratton, Wood, Harvey, Cummins, Gordon, Tulloch, Braughton-Alcock and many others.

In addition to the typhoid-coli group of organisms, in which much work has been done, the absorption method has also been employed in the elucidation of other groups of bacteria, including cholera and cholera-like vibrios, pneumococci and streptococci, and the Gram-negative diplococci, including gonococci, meningococci and allied organisms.

TECHNIQUE OF THE ABSORPTION TEST.

Let us suppose we have a paratyphoid B serum agglutinating powerfully both the *B. paratyphosus* B and *B. aertryke*, the agglutination titre for both organisms being > 1 in 10,000.

To carry out the absorption test proceed as follows:—

(1) Dilute the serum with normal saline so as to have a 1 in 50 dilution (0·1 c.c. serum plus 4·9 c.c. normal saline); put 2·5 c.c. of the diluted serum in a sterile centrifuge tube, which label "Tube No. 1." Put the same amount of diluted serum (2·5 c.c.) in another centrifuge tube, which label "Tube No. 2."

(2) Scrape off with a platinum wire the growth of four or five agar slope cultures of *B. paratyphosus* B and add it to the serum in No. 1 tube. Do not wash off the growth with the diluted serum.

(3) Scrape off with a platinum wire the growth of four or five agar slope cultures of *B. aertryke* and add it to the serum in No. 2 tube. Do not wash off the growth with the diluted serum.

(4) After incubating both tubes at 37° C. for two hours, centrifuge them until the whole of the bacilli are precipitated and the supernatant fluids are clear.

(5) Pipette off the supernatant fluids into two separate sterile tubes, and test the agglutinating action of both fluids up to a dilution of 1 in 10,000 against both *B. paratyphosus* B and *B. aertryke*, remembering, of course, that the serum is already diluted 1 in 50.

The serum, before absorption, agglutinated both *B. paratyphosus* B and *B. aertryke* in very high dilution (< 10,000). After absorption with *B. paratyphosus* B the titre for both organisms will be practically reduced to *nil*, or nearly so (< 400). After absorption with the *B. aertryke* the titre for this bacillus will be practically reduced to *nil*, or nearly so (< 400), while the titre for the paratyphoid *B. bacillus* will be unchanged, or only slightly lessened.

The quantity of bacilli that will be found necessary completely to saturate the serum will depend upon its agglutination titre; a serum with a high titre will, therefore, require the addition of a larger quantity of bacteria than one with a low titre.

Having discovered this method of distinguishing between specific agglutinins and non-specific agglutinins, Castellani applied it to (1) the diagnosis of mixed infections; (2) the differentiation of closely allied bacterial species and types. These two applications of the absorption test may be carried out as follows:—

THE DIAGNOSIS OF MIXED INFECTIONS.

The blood of a non-inoculated patient suspected to be suffering from enteric is found to contain a fairly large amount of agglutinins for *B. typhosus* and *B. paratyphosus* B. Is it a case of mixed infection typhoid-paratyphoid B? or is it a case of typhoid with secondary non-specific agglutinins for *B. paratyphosus* B? or a case of paratyphoid B with secondary non-specific agglutinins for *B. typhosus*? Castellani's absorption method will generally enable us to answer these questions, as it will show which are the *specific* agglutinins present.

(1) Let us assume we have had the following results:—

After saturation with *B. typhosus* the typhoid agglutinins and the paratyphoid agglutinin have disappeared completely, or nearly so; after saturation with *B. paratyphosus* B the paratyphoid agglutinin

has disappeared completely or nearly so, while the typhoid agglutinin remains in practically the same amount. These results show that the typhoid agglutinin is the specific one, and therefore the case is one of typhoid with non-specific agglutinins (coagglutinins) for *B. paratyphosus* B. It is not a case of mixed infection typhoid-paratyphoid B.

(2) Let us assume we have had the following results:—

After saturation with *B. typhosus*, the typhoid agglutinin has disappeared or nearly so, while the paratyphoid *B. agglutinin* remains in practically the same amount. After saturation with *B. paratyphosus* B, both the paratyphoid B agglutinin and the typhoid agglutinin have disappeared completely or nearly so. These results mean that the paratyphoid B agglutinin is the specific one, and that the case is one of paratyphoid B, with secondary non-specific agglutinins for *B. typhosus*.

(3) Let us assume we have had the following results:—

After saturation with *B. typhosus* the typhoid agglutinin has disappeared completely or nearly so, while the paratyphoid B agglutinin remains in the same amount or nearly so. After saturation with *B. paratyphosus* B the typhoid agglutinin remains practically unchanged. The two agglutinins disappear on saturation with *B. typhosus* and *B. paratyphosus* B. The results show that both the typhoid and the paratyphoid agglutinins present are specific, and that the case is according to all probabilities one of mixed infection typhoid + paratyphoid B.

The Diagnosis of Closely Allied Bacterial Species and Types.

Suppose we have isolated a bacillus with the cultural and biochemical characters of *B. paratyphosus* B, and that the bacillus is well agglutinated by a paratyphoid B serum. Is it *B. paratyphosus* B, or is it *B. aertryke?* This latter organism it is well known possesses all the cultural and biochemical characters of *B. paratyphosus* B, and is well agglutinated by paratyphoid B serum. Castellani's absorption method will enable us to give a definite answer, as shown by the work of Boycott and of Bainbridge and O'Brien. If the bacillus we have isolated is really *B. paratyphosus* B, we shall have the following results: paratyphoid B serum saturated with the organism we have isolated will lose completely or nearly so its agglutinin for *B. paratyphosus* B, and also its agglutinin for *B. aertryke*. If the germ we have isolated is *B. aertryke*, then paratyphoid B serum when saturated with the bacillus we have isolated will lose its agglutinating power completely or very nearly so for *B. aertryke*, but will not lose, or only to a slight extent, its agglutinating power for *B. paratyphosus* B.

NOTES ON A CASE OF ANTIMONY POISONING.

By A. Breinl and H. Priestley.

(From the Australian Institute of Tropical Medicine, Townsville.)

Antimony and its salts have lately been extensively used since their beneficial and curative effects in the treatment of different protozoic diseases, and especially in ulcerative granuloma, have been recognized.

Antimony potassium tartrate (tartar emetic) has been employed by us in the treatment of five cases of ulcerative granuloma in Australian aboriginals. One of these cases succumbed to the toxic effects of tartar emetic, proving that intravenous injections, even of comparatively small doses, may suddenly give rise to severe and fatal toxic symptoms.

The patient was an aboriginal boy about 22 years of age. He was admitted to the hospital suffering from extensive ulcerative granuloma in the groin and around the anus, spreading up the rectum.

Treatment was begun with doses of 0·08 grm. of tartar emetic in normal saline solution, administered intravenously, increasing after two days to 0·1 grm., and after a further two days to 0·12 grm.; injections were given on alternate days, until altogether 1·74 grm. of tartar emetic had been given. The surface of the granuloma cleared up under the treatment, and the patient's general health improved considerably. The day following the last injection the patient complained of slight nausea and vomiting, looked ill, and therefore the injections were discontinued. His general condition became rapidly worse, and on the third day after this injection he became delirious, almost maniacal. His temperature rose to about 101° F., and he was found lying on the floor, throwing himself about, vomiting violently. The vomitus consisted at first of bile and mucus, and later of dark blood, which was expelled with considerable violence.

This condition did not improve, and the patient died shortly after the onset of his violent symptoms, sixty-four hours after the last injection. Diarrhœa was never observed, and even up to the time of his death the urine was free from blood and albumin.

The post-mortem performed six hours after death showed slight fatty degeneration of the heart muscle and a few ecchymoses in the pleura. The liver was of normal size, its substance soft and fatty degenerated; the kidneys were congested; the mucous membrane of the stomach was œdematous and congested, but did not show any ulcerations. In the other organs no pathological lesions were discovered. Urine collected at the post-mortem was examined for albumin with negative result.

The histological examinations of the liver tissue showed a widespread fatty degeneration and here and there acute fæcal necroses; there were no extravasations of blood. Sections of the kidneys showed lesions corresponding to an acute interstitial nephritis, with calcareous deposits in the

medullary substance. The other organs proved normal on histological examination.

The post-mortem proved that the patient had succumbed to acute poisoning, almost certainly due to the administration of tartar emetic.

This experience indicates that considerable care must be exercised in the administration of antimony salts, since in this case even comparatively small doses of tartar emetic caused acute toxic death.

VEGETABLE OILS AS ILLUMINANTS AND AS POWER AGENTS.

Oil is assuming an important place in the world, especially that produced from the vegetable kingdom. Time was when such oil was the sole illuminating agent, and in view of the exhaustion of the world's supply of coal, these plant-produced oils, as heating and motor agents, must again come into prominence. They will in the course of time supplant oil springs, petroleum and its products, for they also must give out. The rape oil once so much used will again become of high value, and in many districts attempts are being made to develop the vegetable-oil products. Oil produced from *Sesamum indicum* under the name of simsim or sem-sem is a large industry on the east coast of Africa and the interior lake districts. Uganda and the coastal plains of British East Africa are the chief producers of the plant, from the seeds of which the oil is produced. This oil is often used as a substitute for olive oil, and even for oil of almonds. It is used extensively for cooking purposes in India and by the Arabs. The Brazilian "bicahyba" nut is being thus also utilized, but the production is on too limited a scale at present to yield anything but a limited quantity. Cocoanut oil, olive oil, &c., maintain their place in the world's market, but in course of time these values will grow.

It seems unnecessary to recall what the soya-bean cultivation and soya-bean oil mean to commerce dietetically, agriculturally, and in the arts. It is the foundation of almost all the sauces, relishes, &c., used on the dining-tables throughout the world, the refuse derived from the preparation of the bean is one of the most sought after of manures, and the oil has its uses in many branches of the arts.

Another useful vegetable oil—the Chinese wood oil tree (*Aleurites fordii*)—has a value all its own. Amongst other phases of usefulness this oil has a drying property which has revolutionized the varnish industry in America, and as the oil becomes better known will dominate the world's markets in this branch of industry. Amongst other properties the seeds of the fruit have a purgative action resembling castor beans, with which plants the *Aleurites fordii* is closely allied.

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FEBRUARY 15, 1918.

THE THREAT OF PLAGUE.

THE reappearance of plague in what seems an epidemic form along the Chino-Siberian frontier is a matter of serious import at the present time. For some months now we have had reports of the prevalence of plague, now in the confines of Mongolia, now in the North-western Provinces of China, but nothing is exactly known what the outbreak amounts to. There have also been newspaper statements of trouble between the central Chinese

Government and the local authorities in at least one of the Provinces. The Medical Commission, sent into the plague-stricken districts, headed by Dr. G. L. Tuck, already famous for his excellent work in the last outbreak in the Mongolia districts, have been obstructed in their investigations and attempts to deal systematically with the epidemic. The obstruction is a mere question of detail, trifling it would seem to be, a mere technicality, but sufficient to paralyse the efforts of the Medical Commission on the spot.

It is hopeless to unravel at this distance what the cause of the obstruction is, but it is not uncommon in China and in other countries to find resentment of the kind by local authorities in a matter of the outbreak of an epidemic, especially of so dread a disease as plague. We are well acquainted with reticence in declaring the presence of plague in similar circumstances in many countries, our own not excepted. The primary reason assigned—namely, to allay a scare amongst the people—is usually looked upon as sound diplomacy. Whether this is so or not is a matter of opinion, and the anticipated benefits are all too often distinctly negatived by subsequent events. Another reason for judicial smothering or obscuring the fact that plague is present amongst a community is the harm to trade which will promptly occur the moment a district, a town, or a shipping port is declared infected. The writer well remembers the odium incurred upon his announcing that plague was present in Hong-Kong in 1894; but Hong-Kong is no exception to this well-nigh universal resentment in almost every country from the appearance of plague in Bombay in 1896 to the more recent threat of danger in Bristol a year or two ago. We are not quarrelling with the desire to the "say-nothing-about-it" policy, provided that policy is accompanied by systematic and active steps being taken to meet the outbreak, as has been the case in Britain or in Australia; but when the authorities not only deny the existence of the disease, and at the same time do nothing to stem the spread, it is a matter which cannot be tolerated in the world to-day. In this last-mentioned category are the Chinese authorities in the present plague-affected districts, and knowing the present state of Europe to-day, it may be followed by a calamity before which the War itself would sink into insignificance. Europe at the present time is on the verge of famine, except perhaps the fighting men at the several fronts; the civil population of Europe is on a restricted, not to say an insufficient, diet. If there is any truth in the association of the words in our Church service, "Plague, pestilence and famine," and we have no reason to doubt that these terms are affiliated, then we are in a precarious state indeed.

It has been reported within the past few days that plague has reached Petrograd; if so, it is unnecessary to press home the immensity of the danger. In Petrograd and throughout Russia law and order are in abeyance, mob-rule holds sway with all its attendant dangers, but no danger can be conceived to be greater than the appearance of plague amongst a disorganized horde of people who have acquired the "liberty" which the Russians are professing to have attained. It is only by "law and order" that plague can be handled; and only by the observance of systematized sanitary laws and regulations that it can be thwarted in its spread. The countries on the eastern flank of Europe are all at war; but even in times of peace neither Russia nor Turkey are calculated to serve as a sanitary barrier to the rest of Europe. At the present moment the situation is worse; civil war in Russia and the newly acquired "liberty" of its people leaves no room for sanitation or the imposing of prophylactic measures necessary to deal with an epidemic. Turkey is in no better plight; behind Russia in sanitary measures until the other day when Russia acquired its "liberty," Turkey is without the means of protection against disease at any time, and never more than now.

We can look, therefore, to no hope of protection from either of these countries, but the opposite rather, for at best of times their sanitary conditions are primitive to a degree, but now with war, scarcity of food, and the freedom from all restraint of authority, whether civil or military, their position is one which invites any disease. This is bad enough, but when that disease is plague the prospect is one which is appalling. One does not wish to add scaremongering to the threat of an invasion of Europe by plague; it is considered injudicious to do so; it is contrary to diplomatic custom to be an alarmist, and he who does so is looked at askance. That may be so with most epidemics, but with plague it is a different story. The history of plague seems that once in 300 years it becomes pandemic; if that is so it is due now; for it is nearly 300 years since it last prevailed in Europe. During the last twenty years we have warning of its presence in the earth, and there are few countries indeed in the world in which cases of plague, in a limited form it is true, has not occurred. It became pandemic in the year 1900 and for a few years subsequently, but the outbreaks were but slight; in Britain alone we have had no fewer than seventeen local attacks. But that was when Europe and the world generally was well fed, peace prevailed, and there was all the means at hand to deal with the outbreak; now the opposite obtains and we await with dread what may occur, if the rumours to hand have even the foundation of truth in them.

The nature of the disease is said to be pneumonic plague; the most deadly form of the disease it is true, but yet, curiously enough, it is not the variety calculated to spread most readily. Pneumonic plague is looked upon as being passed from man to man directly. The expectoration, the breath, as in coughing, coming in contact with the face, is considered the channel of infection. The expectoration in pneumonic plague is of the character of almost a pure culture of the bacillus, and the

bacilli coming in contact with the mucous membrane of the eye, nose, or mouth is sufficient to infect. Doctors, nurses, and attendants upon those suffering from pneumonic plague are the chief sufferers. The opposite obtains when the disease is of the bubonic variety, for it is the people outside the hospital, not those on duty in the wards, that are the victims. It is rare, more especially in a newly created epidemic plague hospital, for doctors, nurses, or attendants in hospital to develop bubonic plague, the explanation being that a newly erected temporary epidemic hospital is not as a rule infested by rats, as it is situated beyond the confines of the town, and until rats find their way thither (as they will do after a period), the residents in the hospital remain much freer from the disease than those in the town itself. This is a plea for the shifting of a plague hospital every few months so that the presence of rats is prevented and thereby the danger to hospitals residents is lessened. How far pneumonic and bubonic plague are interchangeable is a matter of some interest; that cases of pneumonic plague occur during the bubonic variety is a fact; but one type prevails at a time not to the exclusion of, but to the marked rarity of, the other.

In one town the bubonic type prevails, whilst in another town not far distant the pneumonic variety is almost exclusively met with; that the one town was infected from the other there is no doubt, but the reason for the prevalence of the varieties in one to the well-nigh exclusion of the other is obscure. In the Mongolia district in 1911 and 1912 pneumonic plague held sway—that is to say, direct infection from man to man occurred. This was in a sparsely populated district where large cities were unknown and the population is scattered. The people of the district, especially in winter, seldom met, yet did direct contact seem to be the channel of infection. It is true some of the animals of the region, and markedly the tarbagan, was infected, and was considered to be the channel of transmission by some observers. If, however, it is true that man to man is the usual form of infection in pneumonic plague, the chances of widespread infection, especially in country districts, presents a more hopeful view in the present instance, when it is stated, with what truth we know not, that it is not bubonic but pneumonic plague that we have before us.

On the other hand, it would seem more easy in a way to deal with bubonic plague spread by rats, for we can destroy the rat, locally it may be, yet sufficient to stave off the disease; but with pneumonic plague, although we regard actual contact with the sick as the most usual mode of infection, we believe it spreads also by other channels not yet clear. If so, then is the staying of the epidemic more difficult. We can isolate the sick, of course; but even then in a crowded city infection is possible from clothing, from food, from expectoration in the houses, or even in the streets the bacillus may be transmitted to the healthy.

What is to be done if this pneumonic plague (assuming that the present outbreak is of that variety) become epidemic in Europe? How is it to be met? With a semi-starved civil population, with men fighting on soil impregnated with the carcases of animals, the graves of men, and dwelling underground to a great extent in vermin-infested dug-outs are conditions calculated to favour the spread of plague of any variety, but more especially the pneumonic variety, should the specific bacillus find its way amongst them. This may be an acute problem to-morrow, one demanding all the ability, skill and organizing power of our sanitarians to meet. Space forbids dealing with the steps that might and ought to be taken to meet such a development, but in the next issue the matter will be brought forward and discussed.

Annotation.

Staggers in Sheep in Patagonia (F. S. Jones, V.M.D., and J. F. Arnold, D.V.M., *Journ. Experimental Medicine*, December).—Only two cases were found of sarcosporidia described by J. P. M'Gowan. Investigations into the disease of sheep called "scrapie," with especial reference to its association with sarcosporidiosis.—*Edinburgh and E. Scotland Agricultural Report*, 1914.

The disease is not due to want of vitamines, a conclusion agreeing with that of A. Theiler: "Contribution to the study of deficiency disease, with special reference to the Lambziehte problem in South Africa," *Third and Fourth Reports, Union of South Africa, Department of Agriculture*, 1915.

After observation and experimental work, both in the field and laboratory, the following conclusions seem justified:—

(1) Staggers is a non-infectious disorder affecting horses, cattle and sheep.

(2) The disease is characterized by weakness, muscular twitching, irregular movements of the head, stiffness of the limbs, and transient motor paralysis, accompanied with spastic spasms on excitement. There is also a derangement of vision and conjunctivitis.

(3) The post-mortem lesions are not characteristic.

(4) We readily produced the disease by feeding susceptible sheep on a coarse tuft grass commonly known as coiron or pampa grass (*Poa argentina*).

(5) The time required to produce definite symptoms by feeding the grass varied. Two animals developed typical staggers after two feedings; in another instance a period of twenty-one days of feeding was required. The average time for the production of unmistakable symptoms in our experiments was ten days.

(6) Many sheep recover from staggers spontaneously. A complete change of diet will usually effect a cure within two weeks.

(7) Older animals that have been pastured for long periods on lands where the grass grows become tolerant and are rarely affected with staggers.

(8) The grass is toxic to sheep at all seasons of the year. We fed late winter and early spring grass and grass in flower, and produced staggers in every instance. The young green grass is as toxic as any edible portion of the plant.

Abstracts.

THE PHARMACOLOGY OF THE OIL OF CHENOPODIUM, WITH SUGGESTIONS FOR THE PREVENTION AND TREATMENT OF POISONING.[1]

By W. Salant.

The oil of chenopodium is an essential oil, which first came into use in therapeutics in the treatment of ascariasis, but in recent years it has also become the chief remedy against ankylostomiasis, and is at present practically the only drug used for the eradication of this disease.

Physiologic Action.

It is a strong local irritant, causing severe inflammation of the mucous membranes. Even very small quantities may prove very toxic and cause death when given to different animals. One-half c.c. of the oil given by mouth to a medium-sized rabbit produced symptoms of severe poisoning, such as vomiting, convulsions, coma, paralysis, and death. Of particular importance is the observation that a dose which is not effective at first may cause serious symptoms and death when repeated within one or several days. Sensitiveness to the oil of chenopodium persists for from five to nine days. This is well worth remembering when the dose has to be repeated, as is sometimes the case, in the treatment of hookworm, for the first dose may not prove efficacious, and a second or third dose is required to accomplish the desired result. Attention was also called to the effect of the nutritional condition and of diet on the toxicity of the oil. Fasting or poorly nourished animals succumbed to much smaller doses. The resistance was noticeably greater, on the other hand, in animals that had been receiving a rich carbohydrate diet for several days before the oil was given, or when the administration of the oil of chenopodium was preceded by a sufficient quantity of fatty oil, such as olive oil, coconut oil, or castor oil. Quantities which invariably caused death were survived without the production of symptoms of poisoning when any of these oils were given shortly before or after the administration of oil of chenopodium. Very satisfactory results were also obtained when several doses of about 15 c.c. of the fatty oils were given during two or three days preceding its administration. That disturbance of renal function may be caused was shown in experiments in which the permeability of the kidney was tested after the administration of the oil of chenopodium, for fat-soluble dyes injected subcutanously or when fed by mouth failed in some cases to be eliminated in the urine of rabbits under these conditions. Its effect on the kidney was further illustrated in another series of experiments in which evidence was obtained indicating that under certain conditions it may cause renal irritation, even when combined with some substances that were otherwise its physiologic antagonists. Albumin and casts were frequently found when it was given in an emulsion in acacia to rabbits. But when oil of chenopodium was dissolved in one of the fatty oils which, as previously mentioned, decreased the general toxicity of oil of chenopodium, renal irritation became more marked. This is probably due to the combined action of the two, that is, the oil of chenopodium and the fatty oil each producing renal irritation, the effect being enhanced when both were given together. It is important to point out in this connection that this does not apply with equal force to carnivorous animals, as the same amounts of oil of chenopodium and coconut oil fed to cats seldom produced these results.

Its poisonous nature was also shown by the tendency to cause depression of the circulation and respiration, as well as to lessen the intestinal movements. In experiments on different animals under anæsthesia it was observed that blood-pressure may fall considerably in some instances, as 0·02 c.c. of oil of chenopodium per kilogram when injected intravenously may be followed by a fall of blood-pressure amounting to 40 or 50 per cent. Although this was not the rule, it is well to bear in mind that it occurred with sufficient frequency to serve as a warning to the clinician of the nature of the drug he is prescribing. Evidence was obtained that the action might be due to direct effect on the heart. That the oil of chenopodium is a general depressant is further shown by the effect produced on peristalsis. The movements of the isolated intestines in intact animals may be inhibited by the oil of chenopodium.

Little is known of its fate in the body, but it might be inferred by analogy that, like other essential oils, it is conjugated with glycuronic acids. It is apparently not eliminated uncombined in the urine or in the bile, for its odour in these fluids was never detected. On the other hand, its elimination by the lungs was observed in experiments on animals after its intravenous administration, for the characteristic odour in the expired air was unmistakable. It is evident, therefore, from the experimental data cited above, that the drug is very active. That this also holds for human subjects is shown by the incidence of poisoning with this drug. Of twelve cases reported, nine were fatal. Coutant reported recently one case of severe poisoning, but the patient recovered. Several cases have come under the observation of the medical officers of the International Health Commission. The substance under consideration should therefore be handled with caution when used for internal medication as it has a tendency to affect the central nervous system, the heart, respiration, digestive organs, and the kidneys. In the presence

[1] Abstracted from *Journ. Amer. Med. Assoc.*, December 15, 1917.

of renal or cardiac disorders the oil of chenopodium should be given in small doses only, while in advanced cases of chronic nephritis or heart disease its use would seem to be altogether contra-indicated.

As the liver undoubtedly plays an important part in detoxifying the oil of chenopodium while abnormal changes in the gastric and intestinal mucosa may accelerate its absorption into the circulation, it may be expected that in hepatic and gastro-intestinal diseases it may likewise prove more toxic. The importance of the nutritional condition in determining the toxicity of oil of chenopodium has been established by experiments on animals, as has been sufficiently indicated. This applies also to human beings. Two doses of 10 minims each given in twenty-four hours were toxic, but the patient was 21 years of age and weighed only 95 lb.

Treatment of Poisoning.

When large doses have been swallowed lavage may be resorted to with beneficial results. It carried out promptly after the oil is taken it may prove effective in preventing serious consequences, since absorption of the oil from the stomach is slow.

The importance of not delaying lavage too long after the poison has been swallowed is further emphasized by the fact that absorption from the duodenum was found to be very rapid. In some of the experiments the introduction of oil of chenopodium was followed by the immediate appearance of the characteristic effect on the circulation.

No chemical antidote has yet been found. The treatment in cases of poisoning would, therefore, be symptomatic. Stimulation of the respiratory and the circulatory systems would undoubtedly be of value. In experiments on the isolated heart digitalis and epinephrin are excellent antagonists. The stimulating action of digitalis has been found to be very persistent, and may completely overcome the depression caused by the oil. Caffeine was also tried out. It, on the contrary, aided the action of the oil of chenopodium. Heart action ceased altogether when perfusion with caffeine followed treatment with chenopodium. The action of caffeine in poisoning with chenopodium may be different, however, in intact animals, and is being investigated in this laboratory.

While oil of chenopodium may be regarded as a safe remedy for patients in good physical condition, it should be used very cautiously in poorly nourished and weak or neurotic individuals. A diet containing a liberal amount of fats and carbohydrates, fed at least for several days before the treatment is instituted, may render the drug much safer. The routine administration of large doses of castor oil before and soon after oil of chenopodium, as recommended by Hall and Foster, should be given serious consideration, as it may prove to be of prophylactic value.

TWO CASES OF FILARIASIS.[1]

By Noel E. Waterfield.

The cases are the first recorded from the Hedjaz, and are samples of cases very common in that area. In Jeddah there are hundreds of people with enlarged testicles and swelling of the scrotum.

Mosquitoes (Culex, Stegomyia, and Anophelines) abound, and, apart from the local reservoir of infection, fresh sources become available each pilgrim season, when many pilgrims from Central Africa, where filariasis is rife, pass through.

It is curious that at Suakin, on the Sudan Red Sea littoral, where the conditions are practically identical with Jeddah, even to its being a town through which many pilgrims pass, the disease is unknown.

Case 1.—A male Egyptian, aged 40, a green-grocer, who had lived in Jeddah all his life, except for a visit to Egypt eight years ago, complained of a swelling in the right side of his scrotum, which, when it first appeared five years ago, was painful, but subsequently only caused inconvenience on account of its weight and size. There was a history of two attacks of gonorrhœa twenty-three years ago, and of attacks of fever lasting for a few days at a time. The patient, who appeared in good health, was found to be suffering from a large right hydrocele with some thickening of the cord; the left testicle and cord appeared normal. At the operation the parietal and visceral tunica vaginalis testis was found thickened, indurated, and ecchymosed, and the contained fluid was bloodstained and cloudy.

Case 2.—A male Jeddawi, aged 35, a porter, who had lived at Jeddah all his life, complained of what he thought was a right inguinal hernia of seven years' duration. Patient appeared in robust health, and in the right inguinal region, extending from the interior abdominal ring to within an inch of the top of the testis, was found a tense swelling with no impulse on coughing. On lying down the swelling got smaller, but did not disappear; it then seemed to be fluid confined in a thin-walled half-empty sac. The remainder of the scrotum and contents appeared normal. No obviously enlarged lymphatic glands were felt, the urine was normal, and there was no swelling of lower extremities. A lymphocele was diagnosed, and patient advised that no operation was advisable unless a hernia should develop later.

The blood of both these patients when drawn at night-time was found to contain embryos of *Filaria bancrofti*—in that of Case 1 about three to four to a drop, in that of Case 2 as many as ten to fifteen. No embryos were found in the blood drawn during the day.

Of two Jeddah patients, one had double hydrocele with thin-walled sac and clear fluid, another had a large right lymphocele, small right hydrocele, and some epididymitis of the left testis due to a recent

[1] Abstracted from *Brit. Med. Journ.*, January 12, 1918.

attack of gonorrhœa. The lymphocele had been noticed for twelve years. The patient was operated on, as the nature of the condition was not recognized previous to operation.

No filariæ were found after repeated examinations of the blood of these patients, although, at any rate in the case of the lymphocele, at some time or other they must have been present.

LEPROSY IN THE PHILIPPINES.[1]

By O. E. Denney.

One half of the 10,000 cases of leprosy segregated in Culion have been diagnosed in adolescence.

Twenty-nine per cent. of the lepers gave definite histories of contact with leper relatives. No record has been made of contact with lepers other than relatives. It is probable that carefully taken histories would have revealed contact histories for all the lepers isolated, since the disease is widespread throughout the islands.

Thirty-five per cent. of those giving histories of contact with a single leper relative were sisters and brothers, 27 per cent. were cousins, while 11 per cent. were leper children, and 7 per cent. leper parents.

In the occurrence of infection of two or more relatives, the majority of cases were among members of like sexes, the noteworthy exception being the number of mothers and sons infected in excess of the number of mothers and daughters.

Numerous records show multiple infection within families, spreading over one, two, or three generations, more than half of the infected persons being brothers and sisters.

In 1 per cent. of the lepers who were married before admission to Culion, the infection was between husband and wife.

The male sex is more frequently infected.

The average duration of leprosy is 7·3 years.

Mortality among children born of leper parents is high. The incidence of infection among children living in the colony for from one to ten years is 10·4 per cent.

Infection of children born of parents, one of whom is a leper, and living among lepers for from seven to ten years, is 44 per cent.

From this study nothing of importance, other than circumstantial evidence, has been learned regarding the transmission of leprosy.

[1] Abstracted from *Journ. Amer. Med. Assoc.*, December 29, 1917.

Notes and News.

THE "WELLCOME" PHOTOGRAPHIC EXPOSURE RECORD AND DIARY, 1918.

A feature which will at once appeal to the purchaser of the new edition of this popular annual is the fine photograph of a German shell bursting behind the Anzac lines at the battle of Messines. This was taken by the official Australian photographer, Herbert A. Baldwin, and the negative was developed on the spot with "Tancol," one of the British products with which Burroughs Wellcome and Co. are replacing enemy-made developers.

The other illustration shows how pictorial even war may be when it is photographed by an expert. It is entitled "Out of a Cloud of Dust into a Cloud of Bullets," and it is a record of an incident on the Belgian front from the camera of W. Gore, who brings his experiences in the Turco-Balkan Campaign to bear on the present War in the interests of the *Daily Sketch*, London. This negative was developed with "Tabloid Rytol," another British conqueror of the German-made developers.

As for the book itself, it is wonderful, especially in war time, how its good features are maintained, and how it has been found possible to make this edition even fresher and more up-to-date than ever.

This is largely due to the fact that the main article has been entirely rewritten, and, under the title "Photography Simplified," we have the whole art of successful photographic practice, except exposure, which is dealt with in a separate article, made as clear as A B C in about 50 pages.

The great charm of the book is not merely its simplicity, but its precision. The instructions given are so definite that no one can mistake them, and if they are followed no one can fail to obtain successful results.

Ready reference tables for development, printing, enlarging, focussing, &c., are a great feature in this pocket-book, which is a veritable compendium of photographic information.

As for exposure, this book has been the guide, philosopher, and friend not only of thousands of beginners, but of thousands of expert photographers in every quarter of the globe for many years now, and whenever we meet anyone who has used it we hear praises as to its accuracy, simplicity, and reliability.

The little mechanical calculator, fixed to the back cover, really does tell the correct exposure by one turn of one scale, and that alone is worth the small sum of one shilling, for which the book may be obtained from any photographic dealer.

In addition, there are plenty of ruled pages for recording exposures and for photographic memoranda of all kinds, and a diary for the year.

We are glad to note that only plates and papers manufactured in Great Britain, the United States, or other of the Allied countries are given in the list of plate speeds, and it is obvious, from the length and character of this list, that goods are available for the photographer's every need without going to enemy sources.

The Northern Hemisphere and Tropical Edition is prepared specially for use in countries in the Northern Hemisphere and Tropics.

Special editions for the Southern Hemisphere and for the United States of America are also issued.

Original Communications.

TINEA IMBRICATA IN SOUTH AFRICA.

By A. Pijper, M.D.Leyden.
Bethal, Transvaal.

On studying the geographical distribution of tinea imbricata one is faced by the rather startling fact that this disease has been observed in nearly all parts of the world with the exception of Africa. At first it seemed to be localized in certain islands of the Pacific Ocean and the East Indian Archipelago, but soon its domain was proved to comprise many of the other islands in those seas, and even to extend as far as Southern China and Southern India. Recently Brazil and other parts of tropical America were added to this list [1] [2]. Moreover, Sabouraud seems to have noted its occurrence in Europe [3]. Africa is still generally considered to be free from this affection; at least, I have not noticed that a case has been recorded there.

It is hard to imagine the reason why Africa should be thus exempt. The diagnosis is one of

Fig. 1.

the easiest in dermatology, or, as Castellani puts it, "the disease, once seen, cannot be confused with any other dermatomycosis." It might even be stated that it is not necessary ever to have seen a case. The pictures given in text-books furnish one with quite sufficient information to recognize the disease immediately.

I have, therefore, not the slightest doubt but the case of which a photo is given here (fig. 1) should be labelled tinea imbricata. The description of the case exactly corresponds with the data of text-books. The patient was a Mapoch kaffir, between 40 and 50 years old. He came a long way to see the doctor on account of the unbearable pruritus. The greater part of his body, with the exception of his face and scalp, were covered with the typical scales, overlapping each other with their free edges like tiles on a roof. The scales were thin, large and tissue-paper-like; their arrangement in most places was not distinctly circular, so that the case might be classed as belonging to the diffuse variety. The general health seemed good. I had no opportunity to examine the patient's blood. As far as I could find out, he was the only member of his family thus affected. He could not remember how long he had suffered from skin trouble. The diagnosis was unmistakable, so that we have to reckon with the fact that tinea imbricata, or at least a similar disease, occurs in Africa.

We may safely assume that if the disease occurred abundantly in this country the cases would have been recorded. If I may be allowed to discuss the questions arising in connection with the isolated case described here, I should like to point out that the following thoughts suggest themselves.

Firstly, it seems as if, for the development of the affection, a certain condition of the skin is an indispensable factor, and as if this condition is not very prevalent here. An indication as to the direction into which we must look for a closer definition of this condition lies in the well-known observation that the habit the Tongans have of oiling their skin prevents to a certain extent their being made victims of this skin affection, which is not at all rare among the surrounding Fijians who do not have this habit. I believe this same habit of anointing the skin is very common among African natives, and might thus be looked upon as a very useful precaution. To what extent the climatical influences of the different countries play a rôle in bringing on a certain disposition of the skin is another question. Secondly, with this supposition as a working hypothesis, we must assume that the fungus or fungi which may constitute the ætiological parasite are practically omnipresent. We might thus discuss the possibility that, for the production of the disease, it is not so much the parasite that counts as the condition of the skin. This would supply us with a very welcome explanation of some older observations. The fungi, which have been described as the cause of this affection, are of very different nature. Blanchard found his non-cultivable; Nieuwenhuis stated exactly the reverse, and considered his easily cultivable; Tribondeau suspected an aspergillus-like organism; Wehner described his as a real aspergillus [1]. It is true that only Castellani has grown from the lesions a fungus, with which he succeeded in reproducing the affection in normal individuals, but he again found two different fungi, whose cultural characters were widely divergent, and he himself considers it probable that further investigation will reveal the existence of some more species. It may be said again that Castellani's experiments have, for the first time, absolutely proved that the fungi grown by him were capable of causing tinea imbricata, but this does not do away with the possibility that many others may have the same effect, and that a certain condition of the skin is an essential factor. It is useful to remember that certain

diets can certainly cause a deterioration of the existing affection, for this circumstance, too, leads to the consideration that the condition of the skin is of importance for the pathogenesis of tinea imbricata. Such are the arguments that involuntarily suggest themselves when we consider this isolated case. Further research will have to elucidate the questions touched upon here. In the meantime I think it may be in the interest of medical science to place on record the results which the further examination of this case produced.

The scales after being brought into potassium hydroxide solution showed fairly numerous fungoid organisms, though not so numerous as one would

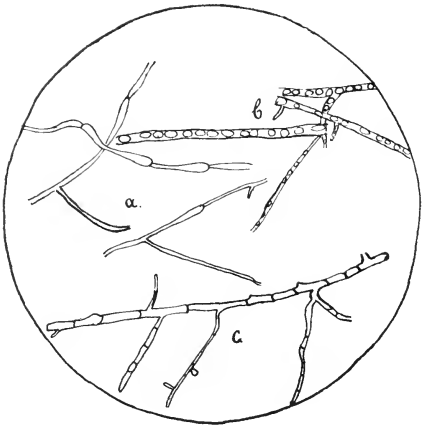

Fig. 2.

Hanging drop cultures. Tinea imbricata. Mag. × 430.
a, glucose-broth, 46 days. *b*. serum-broth, 21 days.
c. maltose-broth, 28 days.

expect, judging from the current description. This may be a consequence of this case presenting a variety of the ordinary affection.

After these preliminary observations I made an attempt at cultivation. At first I imitated Castellani's method (Sabouraud's direct method being an absolute failure), and treated thirty-two scales with alcohol for 5 to 10 minutes, afterwards placing each scale into a separate test-tube containing glucose broth. These tubes were all kept at room temperature, and within twenty-four hours they were quite turbid with a rapidly growing bacillus, most probably a contamination. I then had recourse to a more prolonged treatment with alcohol, but this, too, proved unsuccessful, for the troublesome bacillus invariably made its appearance, even after a treatment of 30 minutes with alcohol. Therefore I made use of the following device: I first inoculated sixteen glucose-broth tubes with the bacillus and placed these into the incubator. The bacillus grew very abundantly within twelve hours. I then sterilized these media and afterwards added a little more glucose (to make up for any loss) and a piece of marble (to neutralize any excess of acidity). Into these media I then transplanted the scales. This time the bacillus had apparently exhausted the medium and no fresh growth developed. The dead bacteria sank to the bottom of the tube and the scales were clearly visible. After one week a fungus started growing from two out of the sixteen scales with which I had continued these experiments. After fourteen days an attempt at transplantation to solid media failed, but after eighteen days a growth on Sabouraud's *milieu d'épreuve* was obtained. This difficulty in obtaining subcultures

Fig. 3.

remained a characteristic feature of this fungus. It seemed as if the ordinary media of the laboratory could not very well supply it with the materials it wanted. Another proof of this unsatisfactory relation was found on examining its development in the hanging drop. Though I tried maltose, glucose, and serum broth, in none of these could I observe any distinct free spores. Practically filaments only were developed, and the maltose broth gave the richest culture of the three (fig. 2).

The further characteristics of this fungus were:—

All cultures became visible after four to five days as a star-shaped white mass, and they always showed a duvet.

Milieu d'épreuve.—After ten days the growth was round and white. After seventeen days the colour became grey, the shape remained round, but the growth consisted of a wall encircling a central depression, whilst round this wall there was a flat margin showing a reddish tinge. Seen through

the medium the central parts were green and the periphery was reddish (fig. 3).

Milieu de conservation.—No growth obtainable.

Maltose-agar.—The growth was very rich and became grey with a central depression after fifteen days. After forty-one days it was nearly black with a red zone at the periphery. The largest cultures showed radial furrows.

Glucose-agar.—Scanty growth for the first fourteen days, remaining white. Later on richer and slightly grey. On the forty-first day it was a flat culture, white in the centre and white at the periphery, showing a grey intermediate zone. No depression.

Saccharose-agar.—On the forty-first day it was still a scanty flat growth of a whitish-grey colour.

Mannite-agar.—Very rich growth, showing central depression and change of colour on the fifteenth day. After forty-one days it was a large culture with radial furrows, nearly black, with a dark red coloration at the periphery.

Lactose-agar.—Beautiful growth with red centre and grey periphery after fifteen days. After forty-one days still the same.

Glycerine-agar.—Very small and quite white culture with central depression after forty-one days.

Agar.—Very small flat culture of a grey colour.

Gelatine.—Whitish-grey flat culture. No liquefaction.

REFERENCES.

[1] Castellani and Chalmers. "Manual of Tropical Medicine," 1913.

[2] Daniels. "Tropical Medicine and Hygiene," 1912.

[3] Plaut, in Kolle und Wassermann s "Handbuch," v.

Unusual Gall-bladder Complication (J. Shoup, *American Journ. of Röntgenology*, November).—Five years after an attack of typhoid the patient was seized with pain in the right hypogastrium, varying in locality and severity. The pain was described as being of a dull, heavy nature, often assuming a pressure-like character. When lying on her left side she complained of a pulling sensation which caused exacerbation of the pain. On the other hand, the intensity of the pain was somewhat relieved by wearing corsets or making pressure over the seat of pain. Operation revealed dense adhesions between the duodenum and the liver. The gall-bladder fundus was connected with the duodenum by means of a tube half an inch in length and as thick as a normal appendix. The fundus of the gall-bladder was empty except for a small amount of fluid which looked like duodenal contents. No bile was present in the gall-bladder, but when a soft cholesterin stone which completely filled the neck of the gall-bladder was removed, bile began to pour into the gall-bladder through the cystic duct.

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THE JOURNAL OF

Tropical Medicine and Hygiene

MARCH 1, 1918.

WEST AFRICAN MEDICAL STAFF.

ABSTRACT OF INFORMATION FOR INTENDING CANDIDATES FOR APPOINTMENT.

The Colonial Office, under date of January, 1918, has issued a circular detailing the conditions of service in the West African Medical Staff.

We have from time to time answered inquiries concerning this important service, and the following details (abstracted), it is hoped, may be of service.

It is to be noted that the conditions vary according as service is in Northern or Southern Nigeria.

Candidates for appointments should apply in writing to the Assistant Private Secretary, Colonial Office, Downing Street, S.W.1, by whom forms will be supplied, which the candidate must fill up with full particulars regarding his career and qualifications and the nature of the appointment he desires; he must name on the form two referees who will answer from personal knowledge for his character and capacity, and he must return it to the Assistant Private Secretary with originals and copies of testimonials (not more than six), which should be sent in all together. The originals will be inspected and returned to the candidate and the copies retained for record in the Colonial Office. He should also enclose a certificate of birth, which will be returned to him.

If from his application he appears to be *prima facie* eligible for appointment the candidate will be asked to attend at the Colonial Office for an interview with the Colonial Medical Appointments Committee. If the candidate is considered suitable his name will be noted on the Secretary of State's list, and will then be considered with those of other candidates as vacancies from time to time occur.

Candidates have to be medically examined as to their physical fitness by one of the medical advisers of the Colonial Office, or, in the case of those residing in a Colony, by a medical officer appointed by the Colonial Government.

Candidates are allowed to express a preference for any particular Colony or Protectorate, and their wishes in this respect will be borne in mind and met as far as possible.

Candidates should on no account apply for or accept, a West African appointment in the expectation of ultimately being transferred elsewhere, as the number of such transfers is exceedingly small.

Officers of the West African Medical Staff who may be transferred to pensionable appointments under the Crown elsewhere than in West Africa do not forfeit their claim to pension in respect of their West African Service on final retirement, provided that they have been members of the Staff for at least twelve months.

Instruction in Tropical Medicine.

Every candidate selected for appointment will, unless the Secretary of State decides otherwise, be required to undergo a course of instruction for two or three months, either at the London School of Tropical Medicine, Royal Victoria and Albert Docks, London, E. (near Connaught Road Station), or at the Liverpool School of Tropical Medicine, University, Liverpool. The cost of the tuition fees, board and residence during such instruction, amounting to a maximum of £48 8s. 10d. for three months, will be borne by the Government in the case of the London School; at Liverpool the cost of tuition will be borne by the Government, but candidates must make their own arrangements for board and lodging; an allowance of £2 a week will be paid to them monthly in arrear for this purpose. A daily allowance of 5s. (but no salary) will be paid to each candidate monthly in arrear during the course, and may be continued subsequently up to the date of embarkation. These payments will be made subject to the candidate signing an agreement by which he will be bound to refund them (1) if he declines to accept an appointment in any of the Colonies or Protectorates for which he may be selected by the Secretary of State, (2) if he fails to obtain the certificate referred to in the next paragraph, or (3) if he relinquishes the West African Service for any other reason than mental or physical infirmity, or is removed for misconduct, within three years of the date of his arrival in West Africa.

Every candidate sent to either of the Schools is required to obtain a certificate showing that he has satisfied the School authorities with regard to his regularity of attendance, progress, and proficiency, and for this purpose to undergo any examinations which they may consider necessary; and if he fails to obtain such a certificate he may not only be called upon to refund the payments made to him or on his behalf, but his selection for the West African Medical Staff may be cancelled.

If at the end of the session there exists no vacancy in the Staff to which a candidate can be appointed, he will be placed in a Reserve and granted an allowance at the rate of £200 a year until the occurrence of a vacancy. The payment of this allowance will commence on the day following the last day of his attendance at the School of Tropical Medicine, and will be continued until he commences to receive half salary on the day of his embarkation for West Africa.

The date of embarkation for West Africa is the date from which appointment to the West African Medical Staff takes effect.

Leave of Absence, Passages, &c.

The ordinary tour of residential service is one year, followed by leave with full pay during the voyages to and from England, and for four or two months clear in England, according as the officer is returning for further service in West Africa or not.

If an officer is detained beyond the year additional leave is given with full pay for ten days in respect of each completed month beyond twelve, whether he is returning or not. If he is invalided before the end of the year the leave with full pay is for the voyages and for ten or five days in respect of each completed month, according as he is returning or not.

Leave granted on the understanding that an officer will return is known as "Return leave," and any pay drawn in respect of such leave is liable to be refunded if he does not return.

Leave may be extended with half-pay for a period not exceeding four months on the ground of ill-health, or without pay on that or other grounds.

Free passages are given to all officers who are granted leave as above. A free passage is also given on first appointment, subject to the officer signing an agreement under which he is liable to refund its cost if he relinquishes his appointment for any other reason than physical or mental infirmity, or is removed for misconduct, within three years from the date of his arrival in West Africa.

Half-pay is given during the voyage out on first appointment.

Outfit.

Information as to outfit generally, including camp outfit, is contained in the West African Pocket Book, a copy of which is given to every officer selected for an appointment in the West African Medical Staff.

Quarters.

At all the recognized stations single quarters, free of rent (but not of rates and similar outgoings), are provided for medical officers, or an allowance is paid in lieu of quarters.

Appointments and Salaries.

The medical services of the West African Colonies and Protectorates—namely, the Gambia, Sierra Leone, the Gold Coast (including Ashanti and the Northern Territories), and Nigeria (Southern and Northern Provinces), form one service under the name of the West African Medical Staff. All the medical officers for the service are selected by the Secretary of State for the Colonies, and are on one list for employment and promotion.

The grades and emoluments of the Staff are at present as follows:—

(*a*) The Director of the Medical and Sanitary Service, Nigeria, receives a salary of £1,400 a year, with a duty allowance at the rate of £280 a year.

(*b*) Principal medical officers receive salaries as follows:—

In the Gold Coast and the Southern Provinces of Nigeria, £1,200 a year, with a duty allowance at the rate of £240 a year.

In the Northern Provinces, Nigeria, £1,100 a year, with a duty allowance at the rate of £220 a year.

In Sierra Leone, £1,000 a year, with a duty allowance at the rate of £200 a year.

There is no Principal Medical Officer in the Gambia.

(*c*) Deputy Principal Medical Officer.—There are four appointments of this grade, two in the Southern Provinces, Nigeria, and one each in the Northern Provinces, Nigeria, and the Gold Coast respectively. Salary at the rate of £900 a year, rising by annual increments of £25 to £1,000 a year, is attached to these appointments, together with a duty allowance at the rate of £180 a year.

(*d*) Senior Sanitary Officer.—There are four appointments of this grade, one each for the Northern Provinces, Nigeria, the Southern Provinces, Nigeria, the Gold Coast, and Sierra Leone. Salary at the rate of £900 a year, rising by annual increments of £25 to £1,000 a year (in Sierra Leone to £950 only), is attached to these appointments, together with a duty allowance at the rate of £180 a year.

(*e*) Provincial Medical Officer.—There are seven appointments bearing this title, two each in the Southern Provinces, Nigeria, in the Northern Provinces, Nigeria, and in the Gold Coast respectively, and one in Sierra Leone, with salary at the rate of £800 a year, rising by annual increments of £25 to £900 a year, and a duty allowance at the rate of £160 a year.

(*f*) Senior Medical Officer.—There are twenty appointments of this grade, with salary at the rate of £600 a year, rising by annual increments of £25 to £750 a year, and a duty allowance at the rate of £120 a year. The Senior Medical Officer, Gambia, is allowed "staff pay" of £120 a year, in addition to duty allowance, but he is debarred from private practice.

(*g*) Sanitary Officer.—There are seven appointments of this grade, with salary at the rate of £700 a year, rising by annual increments of £25 to £800 a year, and a duty allowance at the rate of £140 a year.

(*h*) Medical Officer.—The salary attached to this grade is at the rate of £400 a year, rising by annual increments of £20 to £500 a year, with duty allowance at the rate of £80 a year. Medical officers who have served for five years and are recommended for a higher rate of salary are required to take a special course of study for three months (see paragraph (4) below). If they obtain satisfactory certificates at the end of the course they are placed, on completing six years' service, on a scale of salary at the rate of £525 a year, rising by annual increments of £25 to £600 a year, with duty allowance at the rate of £100 a year.

(3) A medical officer who has served for three years on the maximum salary of this scale (£600) without obtaining promotion is eligible for the grant of further annual increments of £25 up to a total maximum salary of £750 a year.

(4) *Higher Scale of Salary.*—The regulations in regard to the special course of study referred to in sub-paragraph (2) (*h*) above are as follows:—

The approved course of study is the three months' course of the West London Post-graduate College or the London School of Clinical Medicine, Greenwich, in clinical medicine, clinical surgery, and pathology.

Officers are allowed to substitute for this course either:—

(*i*) The course of study and examination for a recognized diploma or degree in public health, sanitary science, or State medicine; or

(*ii*) The course of study and examination for a further medical or surgical diploma or degree; or

(*iii*) If the Governor, on the recommendation of the Principal Medical Officer, approves, a course of study in some special branch of medical or surgical practice (e.g., ophthalmology, dermatology, genito-urinary diseases), or an advanced course at the London or Liverpool School of Tropical Medicine.

Whichever of these courses of study is selected, the necessary tuition and examination fees will be paid by the Colonial Government, except in the event of an officer's deciding to enter for a further medical or surgical diploma or degree, in which case no fees will be paid. In all cases, including the last-named, officers will be allowed their railway fares and the lodging allowances specified in paragraph 17, together with a training allowance at the rate of 5s. a day for the period necessarily occupied by the course of study and examination, on the conditions set forth in that paragraph; and their leave of absence may be extended with half salary so as to allow of a total period of five months in England. The payment of fees, allowances, and railway fares in connection with the course of study and examination for a diploma in public health, &c., is conditional on the officer's undertaking to refund the sum paid in the event of his failing to obtain the diploma or relinquishing the West African service (for any other reason than mental or physical infirmity) without completing two full tours after obtaining it.

(5) *Special Appointments.*—

(*a*) The Director of the Medical Research Institute, Lagos, receives a salary of £600 a year, rising by annual increments of £25 to £800 a year, with a duty allowance of £120 a year.

(*b*) Salary at the rate of £500 a year, rising by annual increments of £25 to £600 a year, is attached to about ten posts (those of Pathologist at Accra, Assistant at the Medical Research Institute, Lagos, and Medical Officers of Health at various places) irrespective of the seniority of the officer holding the appointment. In addition to the duty allowance (£100 a year), staff pay at the rate of £100 a year is also attached to these posts; and the holder of the appointment draws half of the staff pay during leave of absence, the remainder being drawn by his *locum tenens*.

Duty allowances, staff pay, and increments are specially dealt with.

PRIVATE PRACTICE.

All officers of the Staff, except Principal Medical Officers, Deputy Principal Medical Officers, Provincial Medical Officers, Sanitary Officers, and a few other officers holding special appointments, are at present allowed to take private practice under stipulated conditions.

PENSIONS AND GRATUITIES.

Pensions and gratuities on retirement from the service are granted in accordance with the law and regulations of each individual Colony.

On attaining the age of 50 years, or after eighteen years' service (of which at least twelve must have been residential), an officer is qualified for a pension, calculated at the rate of one-fortieth of the last annual salary for each year of service, except that the pension of an officer who has been promoted within three years of his retirement is calculated on the average of his salary for the last three years. If invalided after a minimum of seven years' service he is qualified for a pension calculated at the same rate.

If invalided before completing seven years' service he is qualified for a gratuity not exceeding three-quarters of a month's salary for each six months of service, provided that he has been confirmed in his appointment.

For the purpose of calculating the amount of these pensions and gratuities leave of absence without salary is not counted, while leave with half salary is counted at the rate of one month for every two months of such leave. An addition, representing the value of free quarters, is made to the officer's salary. This addition is as follows: To salaries of £400 a year, an addition of £40; to salaries above £400, but not exceeding £500, an addition of £50; to salaries above £500, but not exceeding £700, an addition of £60; to salaries above £700, but not exceeding £900, an addition of £70; to salaries exceeding £900, an addition of £80.

It will be observed that a pension of upwards of £1 a day is secured to every satisfactory officer who serves for eighteen years, even if he receives no promotion. (18/40ths of £750 + £70 = £369.)

In addition to the ordinary regulations, an officer of the West African Medical Staff enjoys the following special privilege: At the end of nine years (of which not less than six must have been residential) he will be permitted to retire with a gratuity of £1,000, or at the end of twelve years (of which not less than eight must have been residential) with a gratuity of £1,250. All claims to pension are, however, forfeited on the receipt of such a gratuity. In the event of an officer dying in the service after completing the period of residence qualifying him for the smaller or the larger of these gratuities, a sum equal to the gratuity in question will be paid to the credit of his estate.

Abstracts.

PUBLIC HEALTH ADMINISTRATION IN RUSSIA IN 1917.[1]

By C. E. A. WINSLOW.

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THE most unique and significant contribution which Russia has made to the art of public health administration is the organization of a combined system of free medical care and health protection for her rural population through the medium of the zemstvos, or local representative assemblies. The

[1] Abstracted from *Public Health Reports*, December 17, 1917.

problems of rural medicine and rural sanitation are everywhere most pressing and most difficult ones. In Russia, with 85 per cent. of her population of some 180,000,000 living in rural districts, these problems are even more urgent than they are elsewhere. A brief consideration of the way in which their solution has been attempted is therefore fundamental to a conception of the general system of health organization of the new Republic.

History of Zemstvo Medicine.

From the eleventh to the fourteenth century lay physicians gradually made their appearance. Ivan the Terrible brought English medical men over in the sixteenth century, and Peter the Great introduced foreign physicians and sent Russians to learn the art abroad. He studied medicine himself and was particularly interested in its preventive side, personally prescribing directions for controlling plague in Kiev and Little Russia in 1718 and for army sanitation during the war with Prussia in 1722. Under Catherine the Great the Medical Faculty of Moscow was organized and many hospitals were established. The Medical-Chirurgical Academy (now the Military Medical Academy) was founded at Petrograd in 1800.

In spite, however, of advances made in the great cities the rural population of Russia lived and died practically without medical care. They were treated, if at all, by midwives and occasionally by feldschers, the latter being medical assistants of a type peculiar to Russia who have completed four years in the Gymnasium (about equivalent to a secondary school), and have then spent three or four years in special training, which includes elementary anatomy, physiology, with a little bacteriology, pathology, and the like. Fully trained physicians were known in the country only as Government officials who made their appearance on the occasion of an autopsy or of some official inquiry.

The zemstvos or rural constituent assemblies were created in 1864 by Alexander II.

When the zemstvo organization was created there were hospitals in the larger centres of population controlled by the provincial governors, and there were a few small hospitals, chiefly served by feldschers. The emancipated serfs were wholly unprovided for, as were the industrial workers, with the exception of the miners in the Province of Perm. Altogether there were turned over to the newly organized zemstvos thirty-two provincial hospitals with 6,200 beds, and 303 district hospitals with 5,100 beds. These hospitals were for the most part in very bad repair, highly insanitary, and grossly mismanaged. There was rarely provision for adequate isolation of communicable diseases, and it is small wonder that "the necessity of entering a hospital was regarded as a chastisement from God."

The idea of furnishing real medical care, not only to the city dweller but to the peasant in the remote rural districts, seemed to many observers in 1864 too Utopian even to be thought of. The difficulties are indeed great. In some regions villages may be a mile apart with fifty inhabitants per square mile. In other regions villages may be five to fifteen miles apart with five to ten inhabitants per square mile. Yet it was to this herculean task that the zemstvos promptly addressed themselves. At first a compromise was attempted by confiding the routine treatment of disease in rural districts to feldschers under the supervision of itinerant physicians. About 1870, however, the waste of the time of the physician and the inadequate service rendered by the feldscher led to the introduction of the system of fixed medical districts, each provided with a small hospital and a qualified physician. Itinerant service was defended as cheaper and more democratic, but the stationary plan has gradually won its way and become almost universal except in the very sparsely settled districts.

So successful were the zemstvos in the expansion of this side of their work that by 1890, instead of the 335 hospitals with 11,309 beds originally turned over to them, there were 1,422 zemstvo medical districts with 1,068 hospitals of 26,571 beds, and 414 dispensaries. Between the years 1870 and 1890 the number of zemstvo doctors increased from 756 to 1,805, and the number of non-medical assistants (feldschers, midwives, pharmacists, &c.) from 2,794 to 6,778. A large part of rural Russia is now divided into medical districts, each of which centres about a small hospital or dispensary. Medical care is always given without charge, and there has been a steadily increasing tendency to make all dispensary and hospital treatment free as well. The care of the sick is recognized by the zemstvos as a natural duty of society rather than as an act of charity.

The Work of the Zemstvos along Preventive Lines.

Aside from this purely medical work, which was their original function, the zemstvo physicians in most provinces are extending their activities along preventive lines, while in such provinces as Moscow, Petrograd, and Kherson there are completely organized sanitary bureaus aside from the regular zemstvo medical staff. The relation between the prevention of disease and the free medical care of the poor is, however, throughout a very close one, and it is interesting to note that this has come about by the expansion of a State medical service along preventive lines, while with us the reverse process is taking place, health departments, originally organized for preventive work alone, developing as an offshoot provision for medical examination and clinical care of the individual.

By a law enacted in 1852 public health committees with district physicians were created in the provinces, but these district physicians had also to perform all the duties of local legal medicine, and the machinery to be set in action was cumbrous in the extreme. An epidemic in a remote rural district was reported by the Starosta (village head) to the chief of the group of Volosts villages in question,

then to the district police, then to the committee on public health, and finally to the governor. After a month or two the district physician would arrive, to find that the epidemic had run its course, to make a proper report thereon, and to assess his travelling expenses against the afflicted village.

Very soon after the establishment of the zemstvos it became clear that their decentralized plan of organization furnished an opportunity for far more effective public health work than could be hoped for from the bureaucratic provincial governments. In 1867 the provincial zemstvo of Poltava established a permanent medical commission, which presented a report in print in 1869. In the next year the medical society of Kazan began active work along public health lines. Both these groups of physicians, with many others—particularly provincial assemblies of zemstvo doctors—strongly urged the need of special sanitarians to supervise and develop the work of preventive medicine. The higher zemstvo officials were at first unsympathetic with this programme. In 1879 a first step was taken by the employment of a special sanitary expert to study problems of industrial hygiene in Moscow Province. The Province of Kherson appointed seven special sanitary officers in 1886, while Petrograd Province created a sanitary organization with a director and nine district sanitarians only in 1896. Most of the provincial organizations are even to-day without special full-time sanitarians; but the regular zemstvo physicians are expected to devote a certain proportion of their time to school inspection, control of epidemics, collection of vital statistics, and public health education.

Zemstvo Medicine in the Province of Moscow and Saratov.

The Province of Moscow has perhaps the most highly developed organization for the promotion of zemstvo medicine to be found in Russia. It supports at the present time approximately 100 hospitals—one for every 10,000 to 15,000 inhabitants. Each hospital has from twenty to sixty beds, and a personnel on the average of two physicians, four feldschers, and four sisters (nurses). The larger establishments include sixteen to twenty beds for general use, five to twelve for communicable diseases, and three to four for maternity cases. Mental cases are cared for in special institutions maintained by the provincial zemstvos. Each hospital has its dispensary (averaging 100 visits a day), and all medicines as well, of course, as all medical care, are given free. Home visits are made by the regular zemstvo physicians only in serious cases. Financial aid is often given to women in childbirth and to invalids who cannot be brought to the hospital.

For the special work of disease prevention Moscow Province is divided into thirteen sanitary districts, each with a sanitary supervisor in charge, and with two or three assistants to the supervisor in the larger districts. These officials are full-time medical men. It is their duty to inspect and pass on plans for water supplies, sewerage systems, public buildings, and the like, to inspect industrial establishments, to collect vital statistics, and transmit them to the provincial office, as well as to deal with outbreaks of communicable disease. The work of these sanitary supervisors is co-ordinated by the provincial sanitary bureau, which maintains a central statistical division, a laboratory, and a vaccine institute. There is also a sanitary council for the whole province and one for each district within it—the former including representatives of the provincial zemstvo assembly and of the sanitary bureau divisions with the thirteen district physicians—a district council, including representatives of the district zemstvo and of the cities within the district, as well as all the zemstvo and factory doctors of the district in question. Ultimate control of sanitary work belongs, of course, to the provincial and district zemstvo assemblies, with their respective administrative officers. The sanitary code which was in force before the revolution was prepared by the provincial assembly and promulgated by the governor.

The Province of Saratov offers a good example of well-organized zemstvo medicine in a smaller and more rural district. The provincial zemstvo in 1911 maintained a general hospital of 200 beds and a psychiatric hospital of 460 beds for a population of somewhat over 3,000,000. The district zemstvos maintained 123 medical districts with seventy-eight hospitals and 1,106 beds (one hospital bed to 2,525 persons). In addition to the 123 medical districts, each of which had its own physician, medical assistance was offered by feldschers or other medical helpers at fifty-five other points. Forty-five of the medical districts had a polyclinic only, nine had four-bed hospitals, thirty had five- to ten-bed hospitals, and two had hospitals of more than forty beds; 525·9 clinic cases and 9·1 resident cases were treated per 1,000 population; 33·2 per cent. of the provincial budget and 31·6 per cent. of the district budgets were appropriated for medical and sanitary purposes (total of both amounting, however, to only about fifty kopecs per capita).

The regular zemstvo physician is supposed to exercise general sanitary supervision of his district, to combat epidemics, inspect schools, and educate the public on health matters. The zemstvo has provided also in each district a sanitary supervisor with laboratory equipment sufficient for simple chemical and bacteriological examinations, and a central sanitary bureau which analyses vital statistics, publishes a monthly bulletin, maintains a Pasteur institute, and employs emergency workers in case of epidemics (131 such workers, thirteen of them physicians, were employed to combat scarlet fever and typhus fever in 1910, and 231, of whom forty-six were physicians, to deal with cholera).

Before leaving the general subject of zemstvo medicine, a word must be said about the splendid services which the zemstvo organizations have

rendered along army medical and sanitary lines during the War. Just as the zemstvos accomplished in civilian health-protection tasks which seemed impossible to the bureaucratic authorities, so, when the strain of war proved too heavy for the constituted agencies, the union of zemstvos, the union of municipalities, and the Russian Red Cross stepped into the breach and assumed a large share, not only of the medical care, but of the clothing and provisioning of the army. The zemstvo and municipal unions now maintain 200,000 hospital beds in the rear for army use, as well as a large organization at the front, and they have an elaborate and well-organized machinery for purchasing or manufacturing and distributing medical and surgical supplies. A central committee, representing the unions of zemstvos and municipalities, the Russian Red Cross, and the sanitary department of the army, meets every night in Moscow to plan for the evacuation of sick and wounded soldiers, of whom 4,000,000 have been handled by this and other similar committees since the beginning of the War.

In Russia, as elsewhere, the most intensive development along public health lines has taken place in the cities, and particularly in the two cities of Moscow and Petrograd, which are in the 2,000,000-population class. Kiev, Lodz, Odessa, Riga, and Warsaw are the only other cities with more than 400,000 population, with thirty-odd cities with between 100,000 and 400,000 population.

Moscow City Health Administration.

As in the case of provincial zemstvo organizations, Moscow leads also in municipal health administration.

The water supply of the city (averaging in 1915 27,270,000 gallons per day) is derived chiefly from the Moscow River, and is purified by slow sand filtration with chemical coagulation when necessary. About one-sixth of the total supply is, however, contributed by well waters from a distance. Bacteriological results on the treated water are good, and the comparatively low death-rate of the city from typhoid fever is good evidence of the effectiveness of the process.

Moscow is one of the very few Russian cities which have installed comprehensive systems of sewerage and sewage disposal. I was informed that not over a dozen cities in Russia have sewerage systems which receive fæcal wastes, and that only four or five have any system of sewage treatment. Nijni Novgorod has Imhoff tanks, Kharkov trickling filters, and Moscow and Odessa irrigation areas.

Even in Moscow, only the central district of the city is at present connected with the sewers, and in 1915, 572,442 cartloads of night soil (averaging 28·5 poods, or 1,026 lb. per load) were removed from the outlying districts and dumped under highly offensive conditions in areas of low land. The sewage proper, which amounted in 1915 to 18,274,000 gallons per day, flows to two separate irrigation areas, one at Lubline, which treats about two-thirds of the total amount (about five and one-half million gallons in the summer of 1917), and another at Luberzy, which handles the remainder and provides space for expansion in the future as the outer zone of the city is gradually connected. The Lubline farms, which were the only ones I visited, include about 1,000 desiatins (2,700 acres), of which about a tenth is under cultivation, cabbages, rye grass, and willows being among the principal crops. The main part of the area is not cropped, but is operated essentially on the plan of intermittent filtration. Of the total area, about half is clay, a quarter peaty soil (tourbe), and a quarter sand, and operating results differ materially, as would be expected, on the different soils. The clayey and peaty areas treat about 3,000 gallons per acre; the best of the sand areas about 25,000. Doses of sewage are applied to a given area at intervals of from four to ten days, depending on the character of the soil. The sewage pumped to the sand beds, which are on a higher level than the others, is submitted to bar screening (2½ cm. mesh) and brief sedimentation (ten minutes). The rest of the sewage receives no preliminary treatment.

The most interesting thing about the Moscow sewage-disposal plant is the admirable experiments which are being conducted on various alternative methods of treatment by Imhoff tanks, contact beds, and trickling filters (the latter equipped with rectangular and circular Fiddian distributors as well as with American type spray nozzles), and is now devoting particular attention to activated sludge treatment. Four experimental basins are in operation treating 135,000 gallons a day by the activated sludge process with excellent results. The tanks are about 2·5 meters in depth, and are operated on the fill-and-draw plan with four hours' aeration and twenty to thirty minutes' sedimentation. The air is distributed not through filtros blocks, but from 2·5 mm. openings on the under side of 1¾-in. pipe. The result of this procedure seems to warrant its further study. Forty volumes of air per volume of sewage are being used, which is not bad for the extremely concentrated sewage treated, and by improvements in distribution already worked out, this amount of air can be cut to ten volumes of air for one volume of sewage. Constructing of a larger activated sludge plant will release the irrigation area or a considerable portion of it for use as a municipal dairy farm.

Aside from these strictly sanitary engineering problems, the health administration of the city is directed, as far as its general policy and finances are concerned, by a board of health of twenty members. There is also an advisory medical board, representing the hospitals, district and school inspectorate, &c., which passes on recommendations of bureau chiefs as to medical policies and nominates candidates for medical posts, a sanitary advisory board which exercises similar functions in regard to problems of epidemiology and the like, and half a dozen smaller advisory boards which

consider special problems relating to ambulances, hospitals, obstetrics, psychiatry, school inspection, veterinary medicine, pharmacy, &c. This system of advisory boards, through which the expert staffs express their views on the problems of policy which concern them, is very characteristic of Russian health administration in all its phases, and on account of its broadly democratic character is likely to develop even further under the Republic.

Executive authority is divided between three bureau chiefs who deal respectively with hospitals, sanitation, and sanitary statistics, all of them being physicians. This arrangement, with its close correlation between hospitals and sanitation and the recognition of statistics as an independent branch of cognate importance, is also typical of general practice in Russia.

The statistical bureau of Moscow is particularly well organized. It is equipped with a library of 50,000 volumes, and its reports (summarized in the volumes of the *Annuaire Statistique de la Ville de Moscou and Bulletin Recapitulatif de la Ville de Moscou*) will repay careful study.

The routine sanitary work of the city is conducted by twenty district medical inspectors, who are charged with the general functions which belong to the divisions of communicable diseases and sanitation in an American city health department—that is, they visit cases of acute communicable disease, secure their isolation, study the epidemiological factors involved, and inspect factories, lodging-houses, and the like. The work of terminal disinfection, which still occupies a very prominent place in Russian sanitation (and with some propriety in view of the prevalence of insect-borne diseases), is cared for by a chief disinfector with some twenty-five assistants; and the city maintains an elaborate disinfecting station for clothing and bedding with steam and hot water disinfection, and with a "Japanese chamber" for combined heat and formalin treatment. For food control there is a separate force of twenty inspectors, and analytical work is carried out in a well-equipped food and water laboratory. Diagnostic examinations are made at the university and the various hospitals.

(To be continued.)

A CASE OF SEPTICÆMIA DUE TO INFECTION BY *BACILLUS DYSENTERIÆ* SHIGA.[1]

THE following case is of special interest in presenting several abnormal clinical and pathological features:—

Driver A. B., aged 21. On July 22 diarrhœa commenced—twelve to fourteen stools daily; headache from onset, but no abdominal pain or tenderness. On July 27 he was admitted into a dysentery ward of the military hospital at Malta—exhausted and collapsed, with sordes on teeth and lips, furred tongue, extreme thirst, constant headache, marked restlessness, and incontinence of urine and fæces. The temperature was 99° F., and the pulse 84. His appearance suggested a severe typhoid condition, so much so that, although admitted as a suspected dysentery, antidysenteric serum was withheld pending the pathological examination of the stools. He could answer questions, and remained quite rational for the first twenty-four hours. No enlargement of liver or spleen was detected, and no abdominal pain or tenderness elicited; there was no exanthem, and nothing abnormal in heart or lungs.

The stools, which were very frequent, consisted of fluid fæcal matter mingled with blood in considerable quantity. Their glairy appearance suggested amœbic dysentery, but no animal parasites were found by the protozoologist. Tenesmus and straining were absent, and the patient never complained of any abdominal discomfort.

On July 28 he was more drowsy, becoming semi-conscious and incoherent at times. The restlessness had increased—frequently tried to get out of bed—but he took fluids well, and the pulse had improved. The temperature once reached 100·2° F. (its maximum), otherwise it remained about 99° F. till the day of death, when it fell to 97·4° F. The stools now consisted almost entirely of pure, bright blood. His condition steadily became worse, and on July 29, as he was presenting a picture of increasing septicæmia resembling the typhoid state, blood was taken from the median basilic vein for pathological examination. By this time the pathologists had reported the stool culture to be negative to *Bacillus dysenteriæ* Shiga.

On consultation, the view was expressed that the case was probably a fulminating Shiga dysentery, stress being laid on the carinated abdomen associated with the marked toxæmia. 60 c.c. of antidysenteric serum was injected subcutaneously; it was rapidly absorbed. This dose was repeated next day, when it was found that the patient's blood—which had been sown in bile and incubated for twenty-four hours—gave a profuse, pure growth of the Shiga bacillus, and also an agglutination which pointed strongly to Shiga infection. Still no *Bacillus dysenteriæ* Shiga had been found in the stools.

The patient's condition steadily became worse, and, in spite of frequent saline infusions and other stimulative treatment, he died at 8 p.m. on July 30, within three days of admission.

The post-mortem examination showed extensive disease of the large intestine. The whole of the mucous membrane from the ileo-cæcal valve down to the anus was intensely congested, being studded throughout with minute superficial ulcers. The whole appearance showed an exceedingly rapid and fatal infection with *Bacillus dysenteriæ* Shiga, which was isolated from scrapings taken from the mucous membrane of the lower bowel. Nothing abnormal was found in the small intestine.

The points of special interest in the case are:—

[1] Abstracted from *Brit. Med. Journ.*, January 19, 1918.

(1) The rapid progress of the disease, producing a profound toxæmia caused by the septicæmia.

(2) The atypical temperature chart.

(3) The marked cerebral symptoms as compared with the clear mental condition exhibited in ordinary acute dysentery cases.

(4) The absence of any abdominal pain, tenderness, straining, or tenesmus.

(5) The fact that the Shiga bacillus was not isolated from the stools during life, whereas, in the great majority of acute bacillary stools examined during the last two and a half years at this military hospital, positive results have been obtained.

(6) Lastly, and perhaps most interesting, the fact that a pure culture of the Shiga bacillus was grown from the patient's venous blood. Only rarely has it been found possible to isolate the *Bacillus dysenteriæ* Shiga from the blood.

TWO CASES OF ABSCESS OF TESTIS DUE TO *BACILLUS COLI*.[1]

By W. G. Nash.

Case 1.—On February 17, 1913, a gentleman suffered from acute cystitis, following a wetting whilst shooting in Ireland. The urine was acid, and contained a fair amount of albumin with a deposit of pus and blood. It also contained a colon bacillus of the *Bacillus lactis aerogenes* type. Under urotropine the cystitis soon cleared up.

In May, 1913, the patient had a mild attack of epididymo-orchitis, and also suffered from boils, for which he was treated with a vaccine.

On December 13, 1913, he suffered from high fever and swelling of the right testis and epididymis. The urine contained pus. On December 24 an abscess of the testis was opened, and the body of the testis, which had sloughed, was removed.

On January 13, 1914, the epididymis was excised, and a coliform bacillus resembling the *B. pseudo-asiaticus* of Castellani was found in it.

A vaccine was used for a considerable time. There have been occasional mild attacks of swelling of the left epididymis, and *B. coli* is still present in the urine.

Case 2.—On August 11, 1917, a married man, aged 27, had acute swelling of the left testis and epididymis. His history was that whilst serving in the Army he had an acute attack of swelling of the right testis on May 7, 1917. About May 20 the swelling was punctured and pus found. On June 1 castration was performed, and he was told that he was suffering from tuberculous disease of the testis. There was no history of urethritis. He left hospital on July 28, and was discharged from the Army.

On July 31 he returned home to his wife and sexual intercourse took place. On August 2 he had pain in the left testis and slight swelling, which progressively got worse. The swelling of the testis was preceded by frequency of micturition.

When I saw him on August 11 there was redness of the left side of the scrotum, and swelling and tenderness of the left testis and epididymis. From the history of the acute attacks in May and August I diagnosed an infection with *B. coli*, and as he had lost his right testis I advised incision of the left testis with a view to letting out the infected products and saving some part of the testis. On August 12 I incised the scrotum and also the testis and epididymis. The testis had commenced to slough. Pus from the testis contained the *B. coli* and *proteus*. A vaccine was made, and twelve doses were given.

On October 25 the wound had healed, the testis was atrophied, and the sexual functions were a good deal impaired.

Remarks.—The cases related were both due to infection of the testis and epididymis by bacilli of the colon type. It is probable that the infection gained entrance along the vas deferens, as in both cases the inflammation of the testis was preceded by bladder disturbance.

In the diagnosis of this condition we must think of acute gonorrhœal epididymis, acute tuberculosis of the epididymis, and acute torsion of the testis. In both cases the occurrence of gonorrhœa was denied, and there was no history of any urethral discharge. Gonococci were not found in the urine or in the epididymis and testis. Further, gonorrhœal epididymitis very rarely suppurates. In neither case was there any evidence of tubercle in the genito-urinary tract, and the acute onset and rapid sloughing of the testis did not resemble tuberculous disease. Torsion of the epididymis was not present in either case.

As to treatment, the use of a vaccine and early incision of the inflamed structures give the best chance of saving the testis.

[1] Abstracted from *Brit. Med. Journ.*, February 2, 1918.

Reviews.

Glaucoma. A text-book for the student of ophthalmology. By Robert Henry Elliot. Pp. xvi + 546. H. K. Lewis and Co. 1918. 21s. net.

Colonel Elliot's name is specially known in connection with the operation of sclero-corneal trephining, and it is probably the part of the book which deals with the operative treatment of glaucoma that will attract the greatest attention.

The etiology of glaucoma still remains shrouded in mystery, and it cannot be said that the author throws any fresh light on it. He, however, gives a full account of the various theories that have been put forward. Laying aside Birnbacher and Czermak's observation on the vortex veins, unconfirmed by subsequent observers, the effects of excessive blood pressure and arterio-sclerosis,

Schnabel's cavernous optic atrophy, hydrophyllism, his account of Professor Arthur Thompson's work on the scleral spur is very convincing, a pumping action being set up by the contractions of the ciliary muscle opening the spaces of the pectinate ligament, its relaxation allowing the elasticity of the ligament to pull the scleral spur forward and to close and help to empty the spaces into the canal of Schlemm. T. Henderson has advocated the view that a structural change in the pectinate ligament is thus responsible for an obstruction to the escape of aqueous from the anterior chamber.

The closure of the filtration angle by the periphery of the iris coming in contact with the cornea remains in the eyes of the author one of the most important factors in the production of glaucoma.

In the section dealing with diagnosis he deals very thoroughly with perimetry. The usual chart, with an object of considerable size, Bjerum's scotoma for small objects, Seidel's extensions from the blind spot, and Roenne's step, as well as with the various theories which endeavour to account for the loss of function of these various portions of the retina. The author places great value on Schiötz's tonometer. He considers that to rely wholly on digital estimation of intraocular pressure is comparable to judging the temperature of a patient by the hand alone. However, in interpreting the reading of the instrument one has to consider not only the curvature of the cornea, the size of the eye, the resistance of the tunics, but also the age of the patient. Its great value is in watching the progress of a case. In dealing with a doubtful case we must go by no one sign, but must take into account every possible factor which may help us. The author's light sense apparatus would seem to give an accurate method of measuring the threshold of light stimulation and the differential light sense.

The matter of secondary glaucoma is dealt with in a thorough and exhaustive manner.

As to operation, there are two methods available. The broad peripheral iridectomy, which is only of value when as yet no atrophy of the iris has taken place, and the various operations whose sole object is to establish a drain between the anterior chamber and the sub-conjunctival space. Contrary to the usage of most surgeons in this country, Colonel Elliot uses a keratome, and when the A.C. is too shallow to allow it with safety performs scleral puncture beforehand.

Again, he cuts the iris off with a pair of scissors pressed close to the eyeball, instead of the more usual method of tearing off the iris from its ciliary attachment between two radial cuts, holding that this proceeding is provocative of entanglement of the uveal tissue in the section.

The history of the filtering operation dates back to De Wecker's sclerotomy with "cicatrice à filtration" in 1867. Sclerotomy was liable to heal too well. MacHardy frequently used to leave a tag of iris in the wound of his iridectomies.

Lagrange introduced his sclerectomy in 1909, Brookbank James his in 1910, Herbert his wedge isolation in 1910. Elliot and Fergus used the trephine in 1909.

The description of the author's operation is very minute indeed, and would tend to make one who is unacquainted with the operation believe that it is one of considerable difficulty. The essential point of difference between Elliot's trephining and that of Fergus is the position of the trephine wound. The author continues the incision, which raises his conjunctival flap into the cornea, splitting it so that one half of the trephine wound lies in the cornea. He uses in most cases a 2-mm. trephine, though he has used trephine from 1 to 5·5 mm.

For the description of the operation we must refer the reader to the book, which will prove of considerable value not only to the student, and especially to the general practitioner, but also to the ophthalmic surgeon.

Leishmanioses: Kala-azar, Bouton d'Orient, Leishmaniose americaine. Par A. Laveran, professeur à l'Institut Pasteur, membre de l'Institut et de l'Académie de Médecine. Un volume in-8 de 515 pages, accompagné de 40 figures et 6 planches hors texte en noir et en couleurs. Paris: Masson et Cie. 15 fr.

This work is indispensable to all tropical practitioners of human and veterinary medicine.

Fortunately it has an excellent table of contents, which much aids the comprehension of the whole subject, as well as affording a ready reference. It is a matter of frequent regret that English authors do not insist on, and publishers allow, a useful table of contents, especially in books which are often reprinted and in annuals.

The book is an example of what books should be, with well-balanced opinion of the work of others. The author's great experience of all tropical subjects entitles his views to the careful study of the subject in all parts of the world, from kala-azar of China to espundia of Peru, and in many intermediate places.

Tropical Diseases: a Manual of the Diseases of Warm Climates. By Sir Patrick Manson, G.C.M.G., M.D., LL.D. Sixth Edition. Revised throughout and enlarged. London: Cassell and Co., Ltd. 1917. (Cr. 8vo, pp. 968, with 12 coloured and 4 black and white plates, and 254 figures. 16s.)

This work still maintains its position as one of the best read text-books of medicine, being so highly valued that probably no tropical practitioner is without a copy; some have two or three copies, not a few covered with marginal notes and references.

On account of the interchange of doctors and patients between Europe and the Tropics, no Service doctor should leave England without a copy in his kit. The work is brought up to date, and is a library in itself of medicine, of medical entomology and zoology.

Original Communications.

SOME NOTES ON SCROTAL OPERATIONS IN NEGROES.

By ROBERT HOWARD, M.D., B.Ch.Oxon.
Medical Officer, Universities' Mission to Central Africa.

THE following notes are based on operative experience gained in Zanzibar during the six and a half years between 1911 and 1917. For the last three years residence has been continuous, before that it was only intermittent. The patients were mainly Swahilis, together with a few half-caste Arabs. The Swahilis are the descendants of the slave population of the coast, and are therefore drawn from nearly all the negro tribes living between the sea and Lakes Nyasa and Tanganyika. The writer's previous African experience had been gained during a residence of ten years in Nyasaland.

The most striking difference between the tropical diseases prevalent in the two regions lies in the fact that filariasis does not occur in Nyasaland except in certain circumscribed localities, whereas it is exceptionally frequent throughout the island and town of Zanzibar. As will be noted later, this disease has a causative effect in many of the cases that require operative treatment.

The following statistics, compiled from a series of consecutive examinations of the night blood of male patients entering the hospital, irrespective of the cause of their admission, indicate the prevalence of the disease. In each case a single thick blood-film, taken at 8.30 p.m., was examined. It is probable that further and more frequent examinations would have yielded a materially higher number of infected patients, so that these figures may be taken as showing the minimum incidence of the disease

Statistics showing the occurrence of *Microfilaria nocturna* in the blood of Swahili patients:—

Year	Number examined	No. infected with microfilaria	Percentage
1911 ...	86 ...	24 ...	27·9 per cent.
1912 ...	53 ...	12 ..	22·6 ,,
1913 ...	51 ...	14 ...	27·6 ,,
1914 ...	108 ...	29 ...	27·0 ,,
1915 ...	190 ...	66 ...	35·0 ,,
1916 ...	200 ...	71 ..	35·5 ,,
1917 ...	100 ...	33 ...	33·0 ,,
Total ...	788	Total 249	Avg. 31·6 ,,

FILARIAL ORCHITIS.

Acute filarial orchitis and funiculitis is a common complaint. Of fourteen cases which were kept under observation seven resolved and seven ended in abscess. Some of the latter cases were really ill, but recovered rapidly as soon as the pus was evacuated. In some of the cases the inflammation was confined to the spermatic cord and did not involve the skin of the scrotum, and these were almost indistinguishable from slight cases of the disease described by Castellani as endemic funiculitis. Lymphatic varix of the spermatic cord is often observed as a complication of hernia, but alone it does not call for operation.

LYMPH SCROTUM.

Lymph scrotum is a fairly common disease, but unless some degree of elephantiasis is also present an operation is not generally necessary. In these cases I have amputated the affected area of the scrotum twice on account of the lymphorrhœa, and once because of recurrent attacks of septic lymphangitis. Of these three cases two showed microfilaria in the blood.

ELEPHANTIASIS SCROTI.

The following are the statistics of operations for the removal of the scrotum in elephantiasis:—

Operations performed, 40; mortality, *nil*.
Hernia as a complication, 8.
Removal of a testis, 2.
Operation below the penis, 12.
Microfilaria found in the blood, 4.

During this same period three cases of elephantiasis vulvæ presented themselves for operation. Two of these patients had small tumours weighing about ½ lb., the other had a large tumour weighing 5½ lb.

A few of the cases of elephantiasis scroti were large tumours reaching almost to the ground; a good many were of moderate size, weighing between 10 lb. and 20 lb., and in some there was only slight elephantoid change, and the bulk of the tumour was due to the presence of large hydroceles. In twelve of these last cases the skin of the penis was not involved, and it was possible to pull that organ up and to make a transverse incision below it, while forming lateral flaps for the scrotum in the usual manner.

In the other cases the method adopted has embodied suggestions from the published accounts by Manson, Daniels, Cantlie, Castellani, and Stitt. The skin is prepared with tr. iodi. applied twice (i.e., one hour before, and again immediately before the operation), but iodine is not applied to the skin of the prepuce, for it is liable to cause blistering or sloughing; instead, the preputial opening is washed out with lysol and 1 in 1,000 aqueous biniodide of mercury.

The patient lies on the table in the ordinary dorsal position. I can see no advantage in using the lithotomy position as is sometimes recommended. A tourniquet is always used. A rubber cord is passed twice round the neck of the tumour and clamped with a pair of artery forceps. Then two towel forceps are clipped into the skin just below to prevent slipping. Such a tourniquet is quite easy to apply; it is on the sterile area of skin and above the towels; I have never known it either slip or fail to control all arterial bleeding; and, lastly, it can be easily removed by undoing the forceps. It certainly saves much loss of blood, and greatly facilitates the dissection of the testis and penis. The only objection is that when the clamped vessels are

tied off before the tourniquet is loosened some unnecessary ligatures may be applied on veins, but this is a minor operation.

The incisions in the skin are lightly marked out before the tourniquet is applied. Whenever possible an oblong flap of pubic skin, about 3½ in. wide and 2 to 3 in. long, is dissected up from the front of the tumour above the preputial orifice. Sometimes only 1 in. of healthy skin can be obtained, but the longer that this pubic flap can be cut the better, for it is most useful in covering the root of the penis, and it has a good blood supply from above and is not liable to slough.

Then lateral skin flaps are marked out at the sides. These incisions are carried backwards as far as can be done by tilting the tumour, but the skin right behind in the region of the perineum is not divided until the tumour is cut away. All these skin flaps are dissected up as far as the tourniquet. Then vertical incisions are made on either side and the testes are sought for. The pink fibres of the cremaster muscle are easily recognized in the midst of the white œdematous elephantoid tissue, and once the spermatic cords are found they are easily traced down to the testes. In only two cases have I found it necessary to remove a testis—each time on account of chronic hæmatocele. Stitt mentions that in the Philippines one testis was removed in 60 per cent. of the cases. I cannot offer any explanation of this discrepancy. Next the penis is freed, and then the question arises as to how much of the preputial skin is to be saved as a covering for the distal portion of the organ. Stitt recommends a length of 2 or 3 in., and Porter (*Journal R.A.M.C.*, vol. xiv, p. 64) even more. I have tried this method, but I find that here in Zanzibar sloughing of a considerable portion of the skin frequently occurs. It is evidently due to lack of a sufficient blood supply. An explanation may lie in the fact that all Swahilis have been circumcised and the true prepuce has been removed, so that this apparent prepuce is really skin pulled down from the body of the penis by the weight of the tumour. Its blood supply comes from above and is necessarily cut off, and the reflux supply from the corona is not, in my experience, sufficient to nourish a flap of more than about I in. in length. Hence, even though apparently thin and healthy skin is sacrificed, it is unwise to cut this flap too long.

If a long pubic flap has been made it is often possible to suture it to the short preputial flap, and so to cover in the penis completely; if otherwise, the central part of the penis must be left to granulate over.

A further objection to the long preputial flap is that even if it lives it is apt to become œdematous and unsightly. If the pubic flap is omitted, and the base of the penis left to granulate, it often becomes much bound down and involved in the scar.

After freeing the penis the root of the tumour is cut away, clamping the vessels as one goes. Then the tourniquet is slipped, and after stopping the bleeding the scrotum is sewn up and the testes replaced. A single tube put through from the root of the penis to the perineum is sufficient drainage. The penis is wrapped in gauze impregnated with tr. benzoini co., and a bulky antiseptic dressing is put over the scrotum, and kept in place by a very wide perineal bandage in the form of a St. Andrew's Cross. The patient is allowed to get up and walk about the day after the operation, for natives do not take kindly to confinement in bed.

Generally the scrotum heals readily by primary union, but the penis is more likely to give trouble, and the edges of the skin may fail to unite. If part has been left to granulate it is a slow process, but the ultimate result is quite satisfactory.

When a hernia has been present it has been my practice to do an ordinary radical cure as a separate preliminary operation, except in cases where it is only slight and easily reducible, and then it has been left untouched, care being taken not to open the sac when the cord is dissected out. In view of the length of the operation and the difficulty of securing perfect asepsis, it does not seem advisable to do a radical cure at the same time as the main operation, as is advised by some authors.

Hernia.

Inguinal hernia is very common among the Swahilis, and a number of patients desire an operation for a radical cure. The following are the statistics of the operations that I have performed:—

Operations, 85. Cases showing microfilaria in the blood, 37 = 43·5 per cent. Right side affected, 58. Left side affected, 16. Both sides affected, 11.

Omentum adherent in the sac, 2 cases.

Cæcum present in the sac, 8 cases.

Appendix present in the sac, 11 cases.

Lymphatic varix of the cord present, 10 cases.

Amongst the natives of Nyasaland hernia was very rare as far as my experience went, whereas in Zanzibar it is a common complaint. Very few of the cases are congenital, but it seems to be acquired at almost any age, young adults, middle aged, and quite elderly persons being equally affected. Many of the cases occur among those who have never done any specially heavy work.

It seems possible that filariasis may be a determining factor. Lymphatic varix of the spermatic cord must dilate the inguinal canal, and the acute swelling of filarial funiculitis is often seen extending right up to the external ring. I have seen one case where an inguinal hernia seemed definitely to follow after recovery from the latter complaint.

It may be a mere coincidence, but it is noticeable that the number of hernia patients who show microfilaria in the blood is distinctly above the average, viz., 43·5 per cent., as compared with 31·6 per cent., which is the average filarial incidence for Zanzibar.

Another striking feature is the great preponderance of right-sided hernia. Excluding cases where both sides are affected my statistics show a proportion of nearly four to one in favour of the right

side; and one of the Zanzibar Government medical officers, Dr. Waller, tells me that the impression he has gained from his experience is that the proportion is about five to one. I have no explanation to offer for this right-sided preponderance, but it seems to be an established fact.

Inguinal hernia in women is not common, and I have not yet seen a case of femoral hernia in a native. The special peculiarity of the cases coming under operative treatment has been the marked thickening of the sac and of the overlying tissues. Frequently the fundus of the sac is densely adherent to the testis or to the sac of a hydrocele, and thick strands of fibrous tissue are often found in the cord, while densely adherent extraperitoneal fat is often present round the neck of the sac. It is probable that four factors contribute to this result, viz.:—

(1) Previous attacks of filarial inflammation of the cord, with or without the formation of abscess.

(2) The application of the actual cautery to the skin over the hernia, which is frequently practised by native medicine men.

(3) The failure to control the hernia by any effectual truss. (If a native obtains a truss he seldom or never uses it intelligently; it is often broken, or applied so as to press on the hernia. I have seen a truss applied to the groin above a hydrocele, and also to the middle of the abdomen, as a cure for indigestion!)

(4) The great tendency to fibrous tissue formation, which is characteristic of the Negro race.

The operation that I have performed has always been Bassini's or Halstead's. I find that the free exposure of the canal that these methods afford is a great help in dealing with the difficulties due to inflammatory thickening. The separation of the sac is often a tedious matter, but the tendency to fibrosis, which is characteristic of the negro, is a help in making the scar firm and the radical cure permanent.

Adhesions in the sac are not very common, and in this connection I may observe that I have only twice found irreducible omentum.

On two occasions the operation had to be abandoned owing to dense universal matting of several coils of intestine, but in one of these cases the swelling had been tapped by a native medicine man under the impression that it was a hydrocele!

A special difficulty that I have encountered in nearly 10 per cent. of the cases is the presence of the cæcum in the sac. In four patients it bulged into the neck of the sac, or into a small interstitial subsidiary sac near the neck, but in four others it had slipped right down, only covered in front by the peritoneum, and in two the outside of the sac just beyond the cæcum had formed dense adhesions to the testis. In fact, the condition was similar to that which is described as "congenital hernia of the cæcum," but it was undoubtedly an acquired condition, and apparently due to the constant dragging of a large unsupported hernia, which had pulled down first the neck of the sac, and then the peritoneum lining the iliac fossa, together with the cæcum. In such cases the only method available is to cut away as much of the front wall of the sac as possible, and then to invaginate the remainder with the attached cæcum into the abdominal cavity, and to restore the posterior wall of the canal by means of Bassini sutures. The appendix has been found in eleven cases, three times by itself, and the other times together with the cæcum. In view of the fact that appendicitis seems to be almost unknown among the Swahilis, I have simply returned it into the abdomen.

Interstitial hernia, i.e., a second sac bulging off from the neighbourhood of the neck of the primary sac, has been encountered five or six times, sometimes in connection with cæcal hernia on the right side, at other times on the left side when the sigmoid flexure was present in the sac.

The bladder has been found once; it formed part of the posterior wall of a large left-sided hernia, and was covered in front only by peritoneum.

Hydrocele.

Hydrocele is also a very common complaint in Zanzibar. In Nyasaland it was not often seen. The reason of its greater prevalence in Zanzibar may be connected with the hot and damp climate, or it may possibly have some relation to the great prevalence among the Swahilis of chronic, generally untreated, gonorrhœa. This disease was not common in the neighbourhood of Lake Nyasa.

The special characteristics of the hydroceles which I have observed are, first, their large size, and second, the frequent presence of marked signs of inflammatory changes in the sac. The two largest that I have treated contained 9 pints and 8½ pints respectively. Others contained 80 oz. and 70 oz., while 50 oz. is quite a common figure, and in cases of double hydrocele each side may contain that amount.

The signs of inflammation of the sac are adhesions and loose tags of tissue, and frequently the presence of irregular bands and plaques of fibrous thickening. These are generally found in old-standing cases that have never been tapped, but sometimes adhesions to the testis are found in quite recent cases of only a few months' duration. Between the thickened bands the sac may bulge irregularly, and this bulging may further lead to decided displacement or rotation of the testis.

Wide separation of the epididymis from the testis is often found, and the former structure may be so stretched as to seem little more than a thickened fibrous band, which may be inadvertently divided unless care is exercised.

As regards treatment, the injection of carbolic acid liquefied with glycerine has been tried in sixty-two cases. No bad results have been observed, and the treatment does not involve residence in hospital. On the other hand, the percentage of cures seems to be lower than that usually claimed for the treatment. Of twenty-eight cases which were traced for some time only sixteen were possibly cured, while in twelve the injection undoubtedly failed, and in

six of them it caused a hæmatocele. It seems probable that the relative failure of the injection treatment is due partly to the large area of the sac, and partly to the presence in it of an inflammatory condition.

Sixty cases have been treated by open operation. Small hydroceles, containing not more than 10 oz., can easily be pushed up and dealt with by inguinal incision, as usually recommended. In large cases a scrotal incision is more satisfactory, but the operation is often a considerable one. Troublesome hæmorrhage may take place from the skin, from the dartos, which is very thick in negroes, or from the fascial coverings. The sac is sometimes much thickened and very vascular, especially in cases where native methods of tapping have been employed. After cutting away the parietal portion of the sac I always oversew the edge of the visceral portion with a continuous catgut suture. This effectually stops the hæmorrhage, and it can be used to secure the eversion of any pouch between the testis and the epididymis. A drainage tube is passed through a counter opening in the bottom of the scrotum and left in about forty-eight hours. Effusion into the tissues, with œdema of the lax scrotal skin, is apt to occur, and such cases often show a considerable post-operative pyrexia, although they heal perfectly by primary union.

The skin of the scrotum blisters very readily, so that iodine must be used with caution, and irritating antiseptic dressings must be avoided. I apply half strength tr. iodi one hour before the operation, and full strength just before it, and I dress the wound with sterilized gauze next the skin, covered with cyanide gauze and salicylic wool. The ultimate result of the operation seems most satisfactory.

When the patient is discharged there is often a good deal of enlargement of the testis, due to thickening of the subcutaneous tissues and to the presence of the thickened fascial coverings which were peeled off the sac at the time of the operation, but in six months most of this will disappear.

When there is a very large double hydrocele with pendulous scrotum it may be advisable to do a more radical operation, similar to that described for elephantiasis scroti below the penis. All the redundant scrotal skin, and also the fascial coverings, can be cut away, and the testis and cords can be reduced to their normal size. They are then replaced in a normal sized scrotum made from the lateral skin flaps. The immediate result of this radical operation is very satisfactory in suitable cases.

Hæmatocele.

Hæmatocele is not infrequently seen, and it is noticeable that in nearly half the cases it occurs insidiously as a primary disease. There is no history of previous hydrocele or of injury.

Out of thirteen operations seven cases were secondary, and the hæmatocele followed a blow on the testis, or the tapping or injection of a hydrocele; but in six cases the history clearly indicated a primary infection. The sac may be very large. In one patient 100 oz. and in two others 80 oz. of the usual thick chocolate-coloured fluid were evacuated. Generally, however, it is small. The wall is always thickened and vascular. The operation is the same as that for hydrocele by the scrotal incision, but many ligatures are required, drainage is very necessary, and suppuration may occur. On two occasions it seemed imprudent to attempt to save the testis, so castration was performed. All the others recovered with the organ apparently in a functional condition.

Drugs and Appliances.

Brom. iso-valeryl-urea, under the trade name of "Dormigene," is the British manufactured "Bromural" of pre-war times. It is an efficient nerve sedative and hypnotic of value in cases requiring such treatment, but is not claimed to be an alleviator of pain. It is non-toxic and may be given to children without danger. It is administered in the form of 5-gr. tablets thrice or more often daily. Prepared by Allen and Hanburys, 37, Lombard Street, London, E.C.1.

An Account of the Principal Works of the Atreya School of Medicine with their Chronology (Calcutta: By P. S. Gupta, 44, Beadon Street. 1917. Kaviraj Biraja Charan Gupta, Kavibhushana). —The late Court Physician of Cooch Behar describes the more prominent text-writers and commentators of the Ayurveda with quotations from ancient Indian medical literature. We learn that there existed two orders or schools of Hindu medicine: (1) the *Atreya*, or what we may call physicians, and (2) the *Dhanwantari* or surgeons.

A VACCINE FOR MALTA FEVER.

We owe to M. Vincent, médecin-inspecteur and professor at the Val-de-Grâce, the discovery of the antityphoid vaccine in most general use, and the same worker has recently communicated to the Academy of Science a method for preparing another vaccine likely to be of material aid in abolishing Malta fever. He has succeeded in completely immunizing goats, by first employing sterilized cultures, and following these up by injecting virulent living cultures of the *M. melitensis* at intervals of five or six days. Goats thus protected were inoculated with pure cultures of the coccus and fed upon food soaked in the same, and proved completely refractory for a period not yet determined but probably covering their whole life. Nearly 300 animals have been tested, and the result has been convincing whatever the age of the goat. Pregnant goats thus immunized have borne young equally refractory. It is anticipated that the result will be the disappearance of Malta fever from France in the same way that anthrax has been stamped out among sheep.

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THE JOURNAL OF

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MARCH 15, 1918.

THE SURGEON IN THE TROPICS.

A YOUNG medical man proceeding to the Tropics may be well equipped in medicine and may have undergone a course of training in tropical medicine, so that in both these subjects he starts the practice of his profession abroad in all completeness. But when he is confronted by the prospect of surgery, the situation may not be viewed with that confidence which he would wish he possessed. We are apt to think that a schooling in tropical medicine is the sole requisite for medical practice in the Tropics. It is only on taking up his duties that he finds his mistake, for without experience in operating he is handicapped to a degree that may be his undoing or, at any rate, a great deterrent to his success and to his own peace of mind.

He is expected when he takes up his duties, whether it be in the Civil Service or in private practice, to be fit to perform any and every operation; for from a study of the operations in the hospitals in the Tropics it will be found that the most serious major operations are of common occurrence. How and where a young man of, say, 24 years of age is to learn his operative surgery is a mystery. He may learn ligature of arteries, amputations, and excisions of joints from the dead body, but although these were the be-all and end-all of surgery thirty years ago, they are but of secondary importance to-day. He may also learn the mechanism of short-circuiting the bowel on the dead body. A dead body operation is not surgery, however, as we know it to-day, and is but a poor training to one going out abroad where he has to deal with diseases requiring acquaintance with skilled clinical manipulations.

It is the absence of training in clinical surgery that causes many a young man to dread taking up work abroad, where he is expected to be a specialist in everything and to be fit to operate on whatever comes along. It is scarcely fair to send out a young man thus equipped; but the difficulty is to know how it is to be removed. Where is a young man of 23 or 24 to get the opportunity of performing operations? He may have been a house surgeon, yet he may never have had an opportunity of actually doing a major operation, even an amputation of a limb, in the hospital in which he served. It would be well were there established a *clinical school of operative surgery*, where men who have joined the Colonial Service may, under the supervision of the surgeons in the hospital, be given certain operations to do. This should be a regular course. We are sending out our young men well equipped to work intelligently as physicians, but we want them trained in surgery as well, for unless they have actually done the ordinary operations met with in tropical practice they will not be at ease, nor have the confidence necessary to do "anything that may turn up."

As regards the actual performance of surgical operations, there is, of course, no essential difference in the manipulations necessary, whether the operations be conducted in the temperate or the torrid zones; but surgeons practising in warm climates have certain ailments brought more frequently to the operating table than is the case in more northern parts. There are also many other considerations which the surgeon practising in the Tropics has to deal with which were not encountered during his medical training in Britain. In the first place, the patients are natives or they are Europeans living in a climate which is not that

of their native land. Both these groups present new physiological entities to the medical officer newly out from Britain, and therefore have to be considered by him before undertaking any serious surgical operation. The environment is also apt to cause astonishment and some bewilderment to the surgeon when he first sees the operating room. The heat necessitates open windows, which he has been taught to regard as a surgical offence of heinous dimensions in his European school; the presence of the punkah over the operating table causes annoyance, as it delays the patient's going under the anæsthetic, and is also apt to cause chilling of the contents of the abdomen if a laparotomy is being performed; on the other hand, should the punkah be stopped, the operator is horrified to find the sweat from his face dripping into the peritoneal cavity of the abdomen he has opened. These and many other minor points arise in operating theatres in tropical countries, which show that there are environmental difficulties which at first seem alarming, but which soon subside. The windows of the operating theatre may be open, but they must be screened, in the first place, to keep out flies, mosquitoes, &c., and dust as well. In the non-manufacturing cities of the Tropics, where coal fires are rarely used for cooking or warmth, the atmosphere is much less polluted by dust than in European cities; but even at the expense of somewhat lessening the ventilation of the operating theatre, it is a good plan to have a double screen to the windows and doors of a room in which operations are done. It is only when one notices the amount of dust that falls down between the layers of the double gauze screen that one appreciates to what an extent dust does exist in the air of places in the Tropics, where factory chimneys are unknown and the air appears vividly clear. The examination and preparation of a patient before operation should in detail be the same in the Tropics as in temperate climates. Every organ should be examined, and especially should the urine be examined for sugar. In the coast ports especially, where natives take to European ways of living, which usually means meat and champagne *in addition* to their own native food, diabetes is especially prevalent; and considering that rice forms so predominant a part of the diet of tropical natives, the presence of sugar in the urine is not to be wondered at. The lungs have to be examined for phthisis, for the absence of cough is apt to be due to opium, taken either by the mouth or by smoking; and there can be no doubt that the habit of smoking opium, so common in China, was used as a means of allaying cough in the first instance, and as tuberculosis of the lung is so very prevalent throughout the Chinese Empire, the spread of this habit is readily understood. What was a medicinal agent has now become a luxurious indulgence, in the same way that the morphia habit obtains elsewhere. Heart disease is, of course, searched for before an operation, and here the question of the presence or the absence of rheumatic fever, so frequent a cause of valvular diseases, arises. The writer has for many years spoken and written to the effect that rheumatic fever was a disease which gradually diminished as one passed from temperate to warm climates, and that in the Tropics the disease was practically unknown. In going through the Colonial Reports lately, whilst looking up the subject of surgical statistics, I have been struck with the large amount of rheumatism and rheumatic fever recorded from well-nigh every colony, and where it has been omitted it would seem to be where the report is sanitary rather than medical.

Rheumatoid arthritis is a term which has no exact meaning, but the persistency with which rheumatic fever is mentioned in almost every report, and alongside of it rheumatism, which presumably means muscular rheumatism, shows that there is a distinction made, and as these returns are made by medical men who, as students, were well acquainted with the disease rheumatic fever, it is impossible to explain the circumstance in any other way than that rheumatic fever prevails fairly widely in the Tropics, and that my belief, which obtained until a week ago when my attention was drawn to the subject, has had no foundation.

At the same time, during the writer's experience of ten years in Hong-Kong, where the climate is "rheumatic" to a degree, but one case of acute rheumatism was met with, and that was in the case of a European recently out from England, who had a second attack of the disease.

It is possible that errors in diagnosis are accountable for much of the rheumatic fever reported. Malaria with rheumatic pains, and even swollen joints and several other ailments, including undulant fever, may and does simulate acute rheumatism closely.

Recently, in a discussion at the Society of Tropical Medicine and Hygiene, the belief that rheumatic fever occurred only to a very limited extent was fully endorsed.

It is time that this point should be cleared up, for the part played by rheumatic fever in producing heart troubles, and consequently affecting the administration of anæsthetics in the Tropics, is all-important, for it frequently happens that the anæsthetic has to be administered by unqualified and even inexperienced assistants.

Anæsthetics in the Tropics do not cause the surgeon the anxiety they do in Britain. Chloroform is the favourite anæsthetic in warm climates, and there seems no reason to think that it will be supplanted. A sufficiency of air is the chief necessity for the safety of chloroform-giving, and in tropical operating theatres or rooms there is plenty, for we find ourselves practically in the open air. In Europe, owing to the present dread of the entrance of air, the operating theatres are close, and deaths from chloroform are not unheard of. Other anæsthetics in the Tropics are less convenient; the old method of administering ether, with its indiarubber bag and other rubber appur-

tenances, was at a discount, not on account of the gas itself, but on account of the serious effects of a tropical climate on the rubber materials; the recent procedure of giving ether by the open method is not in vogue to any great extent in the Tropics owing to the difficulty of getting the patient under, due to the rapid evaporation of the ether and the necessity of stopping the punkah or shutting several windows to lessen the freedom of the current of air.

Surgical instruments and appliances are a constant source of anxiety and worry to the surgeon in tropical countries. Far removed as he usually is from a local source of supply, he has to depend upon the materials sent out from England, France, Germany or America, and the instrument makers sometimes do not send their best. In ordering instruments for a very large hospital in the Tropics the medical officer has several instrument makers' catalogues, and he picks one from this and one from the other, but the requisition is sent finally to one maker to supply the lot. But this maker has his own syringes, forceps, laryngoscope, auriscope and ophthalmoscope, &c., and he sends his own instead of that specified by the doctor. Then correspondence ensues as to why the particular instrument or appliance specified was not sent, and so trouble is begun and continues; also instruments get broken on the way out, or the plating is said to be bad, needles rust and aspirating syringe needles are blocked. The cause of the latter group of troubles is because the packing was loosely done, and the tin in which the instruments were stored was not soldered. When ordering instruments to be sent out, one imperative condition should be that the tins are soldered. There is a fashion at present to have so-called air-tight cases in an operating theatre for the instruments, and to have air-tight boxes for knives, &c. There is no such thing as an air-tight case of this kind; the air in the box expands as the ship enters the area of tropical heat, only to contract later and suck in the sea damp and rust the instruments on the voyage; from the same cause the plating is affected, and when the box is opened at its destination the complaint comes that the plating was badly executed. It would do away with much of the grievance and grumbling were the doctor in the Tropics to deal with the nearest local agent or chemist, paying him a small percentage on condition that the instruments are in a satisfactory condition when they are handed to the doctor. The agent's loss could be covered by insurance. Were some such plan adopted much of the disconcerting episodes we know of would be lessened and done away with for the most part. The day is not yet past when instruments are sent out to the Tropics in velvet cases, a state of things welcomed by the cockroaches, but not by the purchasers of the instruments. Of appliances, nothing is more affected by the climate than rubber. The best way to deal with rubber tubing is to keep it in water, with it may be a few drops of formalin in a glass-stoppered jar, and to keep it away from the light. Light is the chief cause of deterioration of rubber; the jar containing it should be kept in absolute darkness. Rubber gloves may be kept in powder in a glass jar, into the hollowed stopper of which chloride of lime or bleaching powder is placed and kept in place by a piece of gauze and the whole kept in darkness. Gum-elastic catheters and bougies may be laid in powder and kept in a cool dark place.

Hypodermic syringes are a constant source of trouble. If of glass and vulcanite, or of glass and metal, they soon leak where the glass barrel joins the vulcanite or metal, owing to the heat softening the one and causing alternate contraction and expansion of the other. The syringe made of all metal (or all glass) is better, and it was my insistence on this point to which we owe the all-metal syringe of to-day. The needles should not be of steel, for these corrode after use in a few minutes in a dry climate; and even if the wire is put immediately after use into a wet needle the wire becomes a fixture. Irido-platinum is the only form of needle which should be sent to the Tropics; they keep their sharpness longer than gold points, and they have but little tendency to corrode and get blocked thereby. J. C.

(To be continued.)

Abstracts.

SODIUM GYNOCARDATE IN LEPROSY.[1]

By R. L. Spittel.

It is now over a year since Leonard Rogers's first paper appeared on sodium gynocardate in leprosy (*British Medical Journal*, October 21, 1916).

A 2 per cent. stock solution once a week was used in doses varying from 1 to 10 c.c. further diluted or not.

The *reactions* were always more or less severe, even when such small doses as 1½ to 2 c.c. were used. They consisted of chills, fever rising to anything from 99° to 103° F., headache, pains all over the body, vomiting, &c.; gastritis was frequent and distressing.

Results.—Not in a single case did any benefit accrue. After a prolonged course of several months there was nothing in the condition of the patients to encourage a continuance of treatment, but rather the reverse. Two cases of advanced nodular leprosy got decidedly worse, and were converted from able-bodied men to bedridden decrepits suffering intensely with pains and softening swellings as well as abscesses and ulcers in various parts of the body, a condition from which they made a very tardy recovery.

At first this tendency of lepromata to break down was regarded as a hopeful sign of focal reaction, but was due to embolic formations. It may be argued with justice that these violent sequelæ were due to the large dosage employed. Be that as it

[1] Abstracted from the *Indian Medical Gazette*, January, 1918.

may, there were other cases—early ones—in which the dose used was ½ to 2 c.c.; but no observed improvement occurs under these injections in any lesion of leprosy.

TREATMENT OF HOOKWORM INFECTIONS.[1]

Further experiments as to the value of oil of chenopodium in the treatment of hookworm disease were conducted during the year. The efficacy of this drug was tested under varying conditions of administration, in doses of different sizes, and in certain instances studies were made of its value in comparison with thymol and beta-naphthol. Practically all reports agree that oil of chenopodium is the most effective remedy for expelling ascaris, and that it is more active than thymol in the treatment of infection with oxyuris and trichocephalus. As to its value in the treatment of hookworm infection, however, the reports received have been conflicting in character—the result, perhaps, of differences in the strength and potency of the drug, in the laboratory technique employed, or in the methods of administration.

Alarming symptoms, and sometimes death, have been reported following the administration of the drug in accordance with accepted methods of treatment, and in nearly every instance in less than the maximum dose. Extreme caution in the use of the drug is therefore indicated until its proper method of preparation has been learned, its chemical composition and stability standardized, and a safe dosage and method of administration established. The fact that the drug is a powerful poison, often uncertain in action under conditions at present attending its preparation and administration, should lead all medical officers to be extremely discriminating in its use.

In administering the drug in Nicaragua no arbitrary dosage has been followed. The dose, 1 grm. to 1·20 grm. as the maximum (15 to 18 minims), was followed for a while, but this was found to be insufficient under ordinary conditions. The dose was finally increased to a maximum of 2 grm. (30 minims). In none but very exceptional cases was a dose of 3 grm. prescribed in a dispensary. The maximum dose which can be safely prescribed in dispensaries operating in Central America, where the average weight is about 120 lb., is believed to be 2 grm.

As a rule the dose is proportioned according to age, as follows: Two drops for each year of age to the age of 24, forty-eight drops being considered the maximum. This amount of the ordinary oil of chenopodium, dropped from a dropping bottle, weighs approximately 2 grm. This dose is always given in two or three equal parts, with an hourly, or two-hourly, interval between portions (two hours if given in two equal parts, or one hour if given in three equal parts).

The mode of administration followed is essentially as follows: All solid food is prohibited after the midday meal the day before administering the drug. At 4 p.m. of this day the patient is given a cleansing purge of Epsom salts. By giving this preliminary purge at four o'clock the necessity of having to get up during the night is avoided, since the purgative will have acted, as a rule, before bedtime.

At six o'clock the following morning, before any food is eaten, the first portion of sugar containing the chenopodium is taken, followed by the remainder at hourly or two-hourly intervals. Two hours after the last of the chenopodium, a good dose of Epsom salts (usually a little more than an ounce for adults) is taken to expel the worms. This is repeated, if necessary, in two hours.

Chenopodium oil alone is being used as the basis of treatment. Chenopodium oil mixed with a sufficient amount of oil of eucalyptus to disguise its unpleasant taste and odour (three parts chenopodium and one part eucalyptus), and chenopodium in capsules, are also being used. These treatments are being given to the recruits of the Nicaraguan army, are personally administered by a technical assistant, and all examinations are made with the use of the centrifuge.

In Salvador, oil of chenopodium, given usually in capsules, and thymol with equal parts of sugar of milk, also administered in capsules, are the drugs which have been used. In some instances both oil of chenopodium and thymol have been given to the same patients. When chenopodium is taken the preliminary purge is omitted, a dose of Epsom salts being given in the majority of cases following the last dose of chenopodium. No re-examinations are made in less than one week following the last treatment; in most cases a longer period is allowed. The centrifuge is used, two slides being examined before and two after centrifuging.

In this country experiments were conducted as to the relative efficiency of three methods of treatment—that is, oil of chenopodium alone, thymol alone, and one dose of oil of chenopodium followed by thymol for the second and for all subsequent treatments. These experiments, however, have not progressed sufficiently to draw positive conclusions. From the investigations so far conducted it would appear that with fifteen drops of oil of chenopodium administered every one or two hours for three doses, followed by castor oil, a larger number of persons are cured with two treatments than when thymol is administered.

In three laboratories operating in Panama thymol is used; in one, chenopodium. Each drug is reported as having its advantages. At the close of the third quarter 1916, a change to the exclusive use of chenopodium was being considered, but during the last quarter the results obtained by the laboratory using chenopodium were unsatisfactory. The cause may have been faulty technique on the part of the new microscopists employed in that laboratory, the drug may have been poor in quality, or there may have been some other cause not yet determined.

In administering the drug in Guatemala a mathematical table of dosage is not adhered to.

[1] International Health Board, New York, Report for 1916.

The minimum dose is 0·65 c.c.; the maximum, 3 c.c. To a child below ten years, either the minimum dose is given or the dose is increased according to the physical condition of the child; to an average adult 2 c.c. is given; and to a strong, vigorous male the maximum dose. At each treatment the dose is divided into three portions, with one hour intervals. Two hours following the last dose a purge of sodium sulphate is administered.

During the early months of the work in Ceylon oil of chenopodium was administered in maximum doses of eight minims, repeated in two hours. Castor oil was the only purgative used at this time. Subsequently the dose was increased to ten and then to twelve minims, until it was increased to a maximum of sixteen minims, repeated hourly for three doses. Towards the end of the year magnesium sulphate was used almost to the exclusion of castor oil as a purgative. With the 8-minim doses it was rare that more than 20 to 30 per cent. of cures were secured after two treatments. As the size of the dose was increased better results were obtained, until, among one group of patients, there were 65·7 per cent. of cures after two treatments.

At the present time the dispensers in Ceylon are given the following instructions concerning the administration of chenopodium:—

(1) Oil of chenopodium may be administered in accordance with the following table:—

Age	Dose of chenopodium
1 to 2 years	3 minims hourly for three doses
3 to 5 ,, ... 4 to 5	,, ,, ,,
6 to 10 ,, ... 6 to 9	,, ,, ,,
11 to 16 ,, ... 10 to 13	,, ,, ,,
17 to 50 ,, ... 14 to 16	,, ,, ,,
Above 50 ,, ... 12 to 14	,, ,, ,,

In any instance where it is impossible or impracticable to give three doses for a treatment, the maximum dose may be divided into two equal parts, and the second portion be administered at an interval of one or two hours after the first.

(2) The drug may be administered on sugar, in milk, or in gelatine capsules or globules.

(3) On the evening before the treatment is to be given, a dose of Epsom salts is administered in accordance with the following table:—

Age	Dose of Epsom salts solution
1 to 5 years	4 drachms of the solution
6 to 10 ,, ... 8	,, ,, ,,
11 to 15 ,, ... 12	,, ,, ,,
16 to 20 ,, ... 16	,, ,, ,,
21 years and above 24	,, ,, ,,

Five pounds of Epsom salts dissolved in five gallons of hot water makes the above solution.

In case this solution is objectionable to certain persons, castor oil may be given as the purgative, in which case give as follows:—

Age	Dose of castor oil
1 to 3 years	2 drachms
4 to 8 ,, ...	3 to 5 ,,
9 to 16 ,, ...	6 to 10 ,,
Above 16 ,, ...	8 to 16 ,,

One and a half ounces is usually the maximum dose that should be given to a female.

(4) At, say, six o'clock the following morning give the first dose of chenopodium, and repeat this dose at seven and eight o'clock; at ten o'clock give a purgative similar in size to, or if the bowels moved thoroughly, smaller than the one given on the previous evening.

(5) Only a light meal should be eaten the evening before treatment, and no food and very little water should be taken on the morning of treatment until after the bowels have moved well following the second purgative.

(6) No alcohol in any form, or acids, should be taken for a period of twelve hours before and after taking oil of chenopodium, as these substances assist in the absorption of the drug into the system, and this is very undesirable. Symptoms of poisoning may follow if this precaution is disregarded.

(7) Dispensers on estates should keep their cases under direct observation until after the last dose of the purgative has been given and has acted. Dispensers in the villages should arrange to be notified in case any of their cases become ill after treatment, or if the purgative does not move the bowels thoroughly, in which case it should be repeated.

(8) No treatment should be given until a medical officer has examined the person. The dispenser must not treat persons who have developed the following conditions after previous treatment until after re-examination by a medical officer:—

(*a*) Very old or emaciated persons who are made weak by, or after, treatment.

(*b*) Persons suffering from acute diseases, such as malaria, dysentery, rheumatism, &c.

(*c*) Children under 2 years of age who become ill after treatment.

(*d*) Pregnant women, who should not be treated in any instance.

(9) No re-examination of the excrement should be made until one week has elapsed after the second treatment; such examination should be made one week after each succeeding treatment. Treatments should be repeated every ten days until the case is cured. In case only two doses are given for a treatment, it may be repeated at the end of eight days. The excrement should not be re-examined in less than one week after treatment, for the reason that the drug causes the female worm to stop laying eggs for a number of days, and if examination is made in less than one week, the specimen may be negative when in reality the worms have not all been expelled.

CASE OF CEREBROSPINAL FEVER.[1]

By W. T. Bampton.

The following case, and another case since, appear to have been the only Indians who contracted the disease; furthermore, his having recovered from

[1] Abstracted from the *Indian Medical Gazette*, January, 1918.

the disease, which has had a pretty high mortality among the natives in East Africa, has led me to submit his case for favour of publication.

The patient was altogether forty-seven days in hospital, and was then evacuated to the base to be invalided. He received altogether 60 gr. of soamin intermuscularly in 3-gr. doses, thus:—

First week, daily	7
Second week, alternate days	3
Third week, daily	7
Fourth week, alternate days	3

On admission the case certainly resembled, and was treated as, one of cerebral malaria, although malarial parasites were not detected in the blood. On the following day the symptoms were aggravated, and marked retraction of head and Kernig's sign were noticed. About 60 c.c. of cerebrospinal fluid were withdrawn by lumbar puncture under high pressure. The fluid was very turbid, and the diplococcus was found.

During the first week the patient's condition was certainly bad, he being semi-comatose. Hyperæsthesia, marked retraction of head, strabismus, and unequal pupils were noticeable. An exception to the general rule of diarrhœa was observed in this case; the bowels were particularly costive, and a purgative had to be resorted to frequently. Catheterization was also occasionally necessary. No rash was noticed.

There was a slight improvement during the second week, but patient fell back again in the third week.

Three lumbar punctures were performed, two during the first week and one in the third week; in each case the fluid was under considerable pressure. It will be noticed from the chart that these punctures had a direct bearing on the lowering of the temperature.

Progress steadily commenced after the last lumbar puncture, and by the beginning of the fourth week all symptoms subsided.

During the remaining period of his stay in hospital his progress was steadily maintained. Little or no quinine was administered during this time. Sequelæ noticed in this case were slight deafness, anæmia, debility, and an enlarged spleen; no appreciable sign of mental weakness was noticed.

Patient gave a previous history of malaria.

The disease seems endemic in East Africa among the natives the mortality being between 60 and 80 per cent. This high mortality is partly due to the fact that the disease is generally incidental to the lower or ignorant class of native who is a very difficult subject to treat.

The clinical features of this disease are so characteristic that a microscopical examination of the cerebrospinal fluid is frequently unnecessary as an aid to diagnosis, though a lumbar puncture should always when possible be performed not only as an aid to diagnosis, but also on account of its therapeutic value. When the cerebrospinal fluid is turbid and under high pressure the case is one of meningitis.

PUBLIC HEALTH ADMINISTRATION IN RUSSIA IN 1917.[1]

By C. E. A. Winslow.

Professor of Public Health, Yale School of Medicine; Member American Red Cross Mission to Russia.

(*Continued from p. 54.*)

Finally, there is a third group of twenty medical men for school inspection. Each of these physicians has about twenty schools and some 3,000 children under his care. He inspects the school buildings, and at the beginning of the year makes out an individual health card for each child, and keeps track of all who are in need of special attention. He attends to the isolation of school children and the disinfection of the schoolroom, instructs the teacher in the early signs of communicable disease, and sends children in need of treatment to the general hospitals or to the special school clinics maintained for the treatment of diseases of the eye, ear, nose, throat and teeth. Vaccination is stimulated by sending medical students out to vaccinate free of charge in the poorer districts, but is not compulsory.

The city of Moscow maintained twenty-four public hospitals in 1915 with a total of 6,992 beds, and the number of new patients entering during the year was 72,830; 1,264,676 persons made a total of 2,969,806 visits to the public dispensaries. There is one special hospital of over 400 beds and one special clinic for venereal cases, while cases of this character, if not in an infective stage, may be received at any clinic. There are two sanatoria for tuberculosis with a capacity of about forty beds each, but tuberculous cases are also admitted to most of the general hospitals.

Admirable municipal lodging-houses have over 5,000 sleeping places.

For dealing with the important problem of infant mortality the city maintains three infant welfare stations, at which some 3,000 infants are received during the year and about 100,000 quarts of milk distributed. The principal station, in connection with the Morosov Hospital, is the most perfectly equipped plant for the purpose which I have ever seen. The rooms are light, airy, and tiled, every possible equipment for the medical examination of the infants and for the preparation of milk is provided, and the waiting room is furnished with an admirable collection of models and pictures illustrating good and bad methods of infant care, the models of dangerous foods and the pictures of objectionable methods of clothing and the like being all labelled in red so that the most ignorant mother cannot fail to grasp their significance.

There are also in Moscow three smaller infant welfare stations maintained by a private society for the campaign against infant mortality, which provided for 1,638 children in 1916.

Expenditure for medical purposes has risen

[1] Abstracted from *Public Health Reports*, December 17, 1917.

from 5·2 per cent. of the total municipal budget in 1870 to 14·7 in 1910 and to 17 per cent. in 1914, and over 20 per cent. in 1915, the last two figures being unduly swollen by war conditions. Of what may be considered a normal health budget of 5,078,730 roubles in 1910, 80·8 per cent. was for hospitals, 8·7 per cent. for lying-in hospitals, 5 per cent. for clinics, 3·2 per cent. for public health work, 1·2 per cent. for grants to private hospitals, and 0·9 per cent. for veterinary inspection.

The table below for the 25-year period, 1886-1910, gives an interesting picture of the relative prevalence of various communicable diseases indicated by the numbers of cases recorded.

Disease	Cases recorded, 1886-1910	Per cent. of all communicable diseases
Measles	96,166	19·36
Scarlet fever	72,567	14·61
Diphtheria	68,768	13·85
Relapsing fever	45,861	9·24
Dysentery	45,158	9·09
Whooping cough	32,665	6·58
Chicken-pox	28,743	5·79
Typhoid fever	28,679	5·78
Typhus fever	23,434	4·72
Typhus or typhoid fever	21,842	4·40
Parotitis	13,424	2·70
Variola and varioloid	12,217	2·46
German measles	3,844	0·77
Cholera	3,067	0·62

The death-rates for 1915, as certified for various specific causes calculated on an estimated population of 1,984,000, are as follows, the total registered death-rate from all causes being 22·4.

Cause of death	Rate per 100,000
Typhoid fever	14·9
Typhus fever	1·9
Relapsing fever	0·2
Undetermined fevers (any of above)	1·0
Small-pox	12·2
Measles	91·0
Scarlet fever	70·3
Diphtheria	40·6
Dysentery	46·5
Anthrax	0·9
Intermittent fever	0·2
Influenza	11·7
Whooping cough	17·2
Cholera	6·7
Erysipelas	18·1
Other epidemic diseases	0·7
Rabies	10·6
Syphilis	8·0
Peurperal fever	9·9
Pulmonary tuberculosis	191·1
Other forms of tuberculosis	32·8
Croupous pneumonia	54·4
Other respiratory diseases	351·0
Diarrhœa and enteritis:—	
Under 2 years	352·0
Over 2 years	20·4
Homicide	2·8
Suicide	7·0
Other violent deaths	45·2
All other causes	823·0

It will be noted that measles, as is often the case with us, is the most serious of the acute contagia, that typhoid fever is fairly low, that diphtheria is high, and scarlet fever very high. Typhus and relapsing fevers have been fairly well controlled in recent years, though the central location of Moscow and its heavy railroad traffic have in the past exposed the city to frequent infection with these diseases, which have often made their first local appearance in the lodging-houses. Small-pox is still a serious factor in the death-rate, and dysentery constitutes a grave problem. Pulmonary tuberculosis is fairly high, and is probably much higher than is indicated on the face of the returns, since the figure of over 400 for pneumonia and other respiratory diseases, as compared with less than 200 for pulmonary tuberculosis, suggests defective diagnosis. The rate for diarrhœa and enteritis under two years is appalling.

Health Organization of the City of Petrograd.

The general sanitary organization of Petrograd is very similar to that of Moscow, more highly developed along certain lines, and less complete in some other departments.

The water supply of the city is derived from two sources, a main station on the southern mainland side of the Neva, which supplies about 67,000,000 gallons a day, and a smaller, 15,000,000 gallons, plant on Petrograd Island. The main plant originally consisted of eighteen filters of the English slow sand type, but they have been reconstructed for use as American rapid mechanical filters by dividing each one into twelve sections. On account of deficient capacity it has been the custom at this plant at times to filter part of the water without chlorination and to chlorinate another part without filtration. The bacteriological results of these two methods, as well as of the combined treatment for the year 1914, were as shown below:—

	Bacteria per c.c.	Per cent. positive tests for *B. coli* in $\frac{1}{10}$ c.c.
Raw water	364	47·0
Filtered water	73	3·0
Chlorinated water	16	0·02
Filtered and chlorinated water	5	0·007
Mixtures as delivered	45	1·3

Great difficulty has been experienced in procuring either alum or bleaching powder since the War, and chlorination is now effected by the use of a sodium hypochlorite solution prepared on the spot by the electrolysis of salt.

The smaller plant on Petrograd Island includes ten settling basins, forty-nine American rapid filters, a storage basin, and a Siemens-Otto ozone disinfecting outfit. The filters are of the mechanical wash type, and the ozone apparatus appears to be working very satisfactory, although at high cost. This plant, like the larger one, is now being strained beyond its capacity, and a resort to a wholly new supply brought in from Lake Ladoga will probably prove the ultimate solution of the problem.

The waste disposal system of Petrograd is a curiously primitive one for a great European

capital. There is an extensive series of sewers in the city, but, as in London and Paris fifty years ago, they are not used for fæcal wastes. The latter are collected in cesspools, which are pumped out at night (at intervals varying from two weeks to several months) into special carts with cylindrical metal bodies, which convey the sewage liquids to a disposal station near the west end of Vassilyevsky Island. About 200 such carts reach the station every day. The sewage matters are screened by passing them through Rietisch-Wurl screens, the liquid is discharged through a 10-in. sewer at a point 7 kilometres out to sea, and the screenings are burned in the adjacent garbage destructor.

This destructor, it may be mentioned in passing, is one of two Heenan and Froude 4-unit furnaces, each of which destroys between 180,000 and 216,000 lb. a day. They handle only about a quarter of all the refuse produced by the city, the rest being dumped.

The health organization of Petrograd is centred in the sanitary bureau, which has three main divisions—sanitation, epidemiology and sanitary statistics—although the powers and responsibilities of the three divisions are not sharply limited, the same employees in some cases being responsible to two division heads. Thus the forty district physicians who form the backbone of the staff not only do the work of sanitary inspection, building inspection, and plumbing inspection in their respective districts, but also the work of isolating cases of communicable disease and studying the epidemiological factors concerned. In addition to these men, the epidemiological division has twenty medical inspectors of food stores and eleven medical lodging-house inspectors, or a total of seventy-one physicians in all. The very able head of this division is Dr. Haffkine, a nephew of the bacteriologist who is so well known for his researches on bubonic plague. Medical inspection of schools is now under another city department, fifty physicians being employed, with eleven eye specialists and twenty dentists.

The city has a large contagious-disease hospital, built on the barrack plan, with forty-four barrack buildings and some 1,200 beds. On the hospital grounds there is an elaborately equipped central disinfecting station for the treatment of clothing and bedding. It includes a number of large sterilizers, some operated with steam and some with formaldehyde, all controlled from a central glass-walled observation chamber. There is also at this station an extensive equipment of disinfecting apparatus for house disinfection, and sanitary officials from all over Russia come here (to the number of perhaps a hundred a year) to study the technique of disinfecting practice.

The sanitary bureau has an admirable chemical and bacteriological laboratory. Three bacteriologists are employed, and in 1916 11,974 examinations were made for diphtheria and 1,711 for tuberculosis, besides examination for cholera, dysentery, relapsing fever, typhoid fever, and glanders. In 1908-1910 five bacteriologists were employed to deal with the cholera epidemic existing at that time, and during the three years 26,000 examinations of fæces were made and 13,000 of water. The highly significant results of these cholera studies have been printed by the city in the form of a large monograph.

The city also maintains a vaccine institute, which turns out 300,000 grm. of vaccine a year (each gramme being equivalent to something over ten doses). Since the Revolution the enforcement of vaccination is no longer possible, and the institute had over a million doses of vaccine on hand at the time of our visit.

The division of sanitary statistics is excellently organized. It was interesting to us to note that slips of papers are still used in Russia instead of cards for the registration of births and deaths.

Health ordinances are framed by a central health board, which includes thirty health-department physicians and thirty city Duma members.

The hospitals of the city are at present under a completely distinct bureau organization. Twelve general municipal hospitals are maintained in which, on a given day in August, 1917, there were 12,311 patients. In 1914 the last printed statistics, there were 11,930 beds and 144,704 patients treated. The city also carries on eleven free dispensaries, which average about 450 visits a day. There are fifteen public maternity hospitals with 347 beds. It may be noted in passing that in 1915 24,808 out of 40,141 births in the city of Petrograd occurred in hospitals.

The total expenditure of the city for medical, veterinary, and sanitary purposes in 1914 was 17·8 per cent. of the total municipal expenditure. About one-seventh of this was for the sanitary bureau, whose work has been specially discussed above. This amount will be just about doubled for next year, not to provide for any expansion of work, but simply to allow an increase in salaries to compensate for the fall in the value of the rouble and the increase in the cost of living.

Comprehensive plans are under consideration for the reorganization of the whole system of health administration to bring the hospital care and the preventive work more closely together on the one hand and, on the other, to provide for greater decentralization in local administration for the various districts of the city.

Of the two great problems of tuberculosis and infant mortality, to which our own health departments are now devoting so much attention, the first is still almost neglected in Petrograd as a public health problem. There is one sanatorium in Finland with sixty beds, and out of 144,000 patients received in the general city hospitals during 1914, 10,605 were cases of pulmonary tuberculosis and 1,612 of tuberculosis in other forms. It is believed by many that tuberculosis has materially increased during the War, but on account of the heavy demands placed upon the medical personnel of hospitals and dispensaries accurate statistics are hard to obtain.

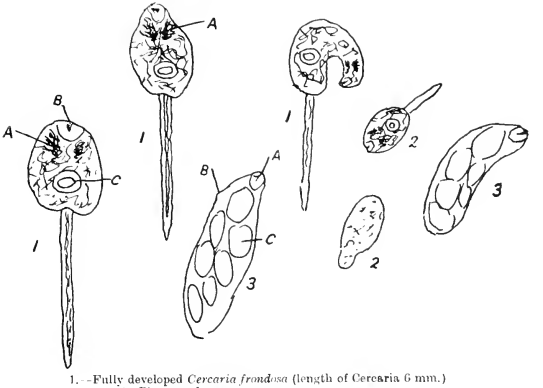
(To be continued.)

Original Communications.

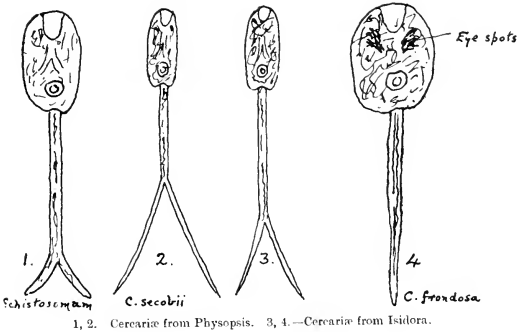
THE POSSIBLE INTERMEDIARY HOSTS OF SCHISTOSOMA IN SOUTH AFRICA.

By F. G. Cawston, M.D.Cantab.,
Captain, S.A.M.C.

There is a significant relationship between the distribution of bilharzia disease in South Africa and the distribution of the common fresh-water snail, *Physopsis africana*. I have collected over 100 infected specimens of this snail from various infected areas of Natal and the Transvaal; from the Durban brickfields, from the Umsindusi at Maritzburg, from the Hex River at Rustenburg, where Dr. Habich, the district surgeon, tells me some 70 per cent. of the boys and 10 per cent. of the girls are bilharzia carriers; from Magaliesburg and Mulder's Drift, where the rivers run into the



1.—Fully developed *Cercaria frondosa* (length of Cercaria 6 mm.)
A. Pigmented eye-spots
B. Oral sucker
C. Ventral sucker
2.—Young specimens *Cercaria frondosa*
3.—Redia, containing *Cercaria frondosa*
A. Oral sucker
B. Locomotor appendage
C. Enclosed cercariæ



1, 2. Cercariæ from Physopsis. 3, 4.—Cercariæ from Isidora.

Little Crocodile River. All these specimens harboured furcocercous cercariæ. All the cercariæ were trematodes, and their divided gut showed no sign of pharynx. There would seem to be at least three different species of trematode worm represented amongst these cercariæ from *Physopsis*. One of them, *Cercaria oculata*, which occurs in the brickfields at Durban, possesses eye-spots, and the prongs to its forked tail are flat and fin-like. Another, which would seem to be identical with the one Dr. J. G. Becker found infesting *Physopsis africana* at Nijlstroom and demonstrated to be the true Bilharzia cercaria, is identical in appearance to the eye-spotted form, but is devoid of the eye-spots. Another form, *Cercaria secobii*, which is common at Maritzburg, is a narrower cercaria, with very long prongs to its divided tail. These prongs are sometimes as long as the rest of the cercaria. The total length of each of these forms is ·6 mm. All these cercariæ develop in sporocysts without the formation of rediæ. In some specimens more than one form is present, though developing in separate sporocysts. Not uncommonly one comes across a specimen of *Physopsis* which contains both furcocercous and leptocercous cercariæ

I have collected specimens of *Isidora* from the Durban brickfields, *Isidora tropica*; from Maritzburg, *Isidora forkali* and *Isidora compta* M. and P.?; and from the golf-links at Potchefstroom, *Isidora schakoi jickeli*, or shells which agree very well with Jickeli's description and figures of *schakoi*. This genus of snail is notoriously polymorphous and the species very variable. I have found a furcocercous cercaria infesting *Isidora* from the golf-links at Potchefstroom. Its appearance is similar to the long-pronged form in Natal, but the prongs are not so long, though they are distinctly longer than those of the true Bilharzia cercaria. I was greatly interested to find this cercaria in a specimen of *Isidora*. Previously I had never encountered a furcocercous cercaria in any species of snail other than *Physopsis*. The intermediary host for *Bilharzia hæmatobium* in Egypt would seem to be a species of *Isidora*. This cercaria from the golf-links at Potchefstroom was developing in motile sacs which had the appearance of rediæ; the observation needs confirming. As some 45 per cent. of the specimens were heavily infested with rediæ producing a leptocercous cercaria, *Cercaria frondosa*, with leaf-like eye-spots, it was difficult to isolate the furcocercous form. Dr. Pirow, who has had thirty-six years' experience as a general practitioner at Potchefstroom, has never yet come across a case of bilharzia disease which could have been contracted locally, and it is unlikely that this cercaria attacks human beings. I can find no trematode worm or cyst-formation in the crabs that abound in the water from which I obtained this infected specimen of *Isidora*: the only other life in this small stream are frogs and small birds; there are no water-fowl and no animals in the neighbourhood. Other specimens of freshwater snail that abound in this locality are *Limnæa natalensis*, *Unio caffer* Krauss, *Corbicula radiata* Parr, and *Pisidium* unidentified; but I can find no cercarial infection in any I have yet examined.

[Previous communications to JOURNAL OF TROPICAL MEDICINE AND HYGIENE: vol. xviii, No. 22; vol. xix, Nos. 13 and 17; vol. xx, No. 5.]

PHARYNGEAL HÆMORRHAGE DUE TO LEECHES.[1]

By J. M. BIGGS.

CASE I.

PRIVATE J. C., aged 24, at dusk in the neighbourhood of Beersheba, ten days before, took a drink of water in his cup from a running stream. A few hours afterwards he commenced coughing and brought up some blood. This continued up to the time of admission to hospital. No sign of lung trouble could be found. The pharynx was congested and his voice was distinctly hoarse. The coughing and hæmorrhage continued until, during the night of the fourth day after admission, he complained of a choking sensation and difficulty in breathing. His cough was very irritable and he expectorated a considerable amount of blood. He coughed something into his mouth which he did not expectorate, as he "feared it was a piece of his lung." On the following morning he found this had stuck to his upper gum, and upon removing it found it to be a leech about 1½ in. long, which he had presumably swallowed a fortnight previously. Since then all discomfort and hæmorrhage have ceased.

The patient had been in Egypt eight months and had had no previous illness.

CASE II.

Private A. T., aged 31, was admitted to hospital on November 24. He was taken ill suddenly seven days before with a tickling, irritating cough, with spitting of blood each time he coughed. He was then in the environs of Ludd in Palestine. He obtained his drinking water from one of the wells; this was drawn up in a bucket, and he always used his cup for drinking. No symptoms of hæmatemesis could be found. He complained of a tickling cough and sore throat, with spitting of blood. The pharynx was congested, and he had pain in swallowing.

During the night of the second day after admission he expectorated half a sputum cup of pure blood mixed with a little mucus. On the following morning the right side of his face was swollen; what looked like dark clotted blood in the cavity left by two extracted teeth in the lower jaw was a leech 1½ in. long attached to the upper jaw. All hæmorrhage ceased upon removing the cause of his trouble.

The patient had been in Egypt twelve months, and had had no previous illness.

[1] Abstracted from *British Medical Journal*, March 9, 1918.

Notices.

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THE JOURNAL OF

Tropical Medicine and Hygiene

APRIL 1, 1918.

THE SURGICAL ASPECTS OF THE WAR.

SURGERY should be, and will be, enriched by the opportunities for observation, for operations, for judging of infection of wounds and their disinfection, for the testing of methods of treating fractures, for the treatment of abdominal, thoracic and cranial injuries, and for the multitude of injuries on a scale unheard of in the world's history. Many nations will have their records of such matters, and as it may be said the world is at war, the medical and surgical work of many nations will be available for instruction, for comparison, and for establishing rules with scientific precision.

Listerism is on its trial, and we have no fear how this great school of thought will emerge from the ordeal. In civil life operations are more or less the result of deliberate consideration and performed for the most part as a matter of election, but it is obvious that injuries in war require as a rule instant decision as to what is to be done with them, and be the circumstances and conditions what they may, treatment has to be proceeded with forthwith. There is neither time nor opportunity for electing this or that step. Be the wound septic or aseptic, tetanus infected or otherwise complicated, the decision as to whether operation is to be done now or delayed has to be settled within a few hours at most after the infliction of the injury. In civil life no doubt cases of the kind come before the surgeon, but they are but an infinitesimal part of peace-time surgery. In war there is no question of tumours, of cancerous growths, of advanced hæmorrhoids, of prostatic removals for disease, of thyroid enlargements, and of the many evils of old age and childhood to be dealt with which obtain in civil life. With these, consultations, deliberation and the preparation of the patient for days, or weeks it may be, should some concomitant such as Bright's disease or diabetes be present, are the rule, and the feelings and wishes of the patient's friends have to be reckoned with before an operation is undertaken or allowed. The wounded soldier is a healthy man and has no constitutional drawback as a rule to be reckoned with. The only question, apart from the intricacy of the operation required, is whether the wound is septic or aseptic, or whether the man is in such a state owing to loss of blood or shock as to be able to stand immediate operation or not. Whether to operate on admission at the Casualty Clearing Station or to send the wounded man to the base, sums up the situation. Will it be better to remove the piece of shrapnel now or not? Will the chances of supervening infection or the effects of tetanus be lessened or increased by treatment now or by delay? These questions can only be settled after the War is over and when there is time for the publication of statistics and hospital records. In the meantime there is no collective information to base a judgment upon. Individual papers on the subject even are scarce, and the official recorder has been too busy with everyday details to bring out statistics to enable a judgment to be arrived at. The surgeons at the Front, and even at our base hospitals, have all been trained during Listerian days. The pre-Listerian surgeons are not in the active field of surgery now. The gap between the two groups is a wide one; not that the older men refuse, nor are ignorant of, nor do not practise aseptic surgery. The Listerian-trained student does not know what it is to have to deal with sepsis on a scale when every wound was practically septic, when "a healthy, creamy, laudable pus" was a matter to rejoice over and to sleep soundly upon; but, on the other hand, erysipelas, subcutaneous erysipelas, phlegmonous erysipelas, sloughing flaps, phlebitis, lymphangitis, gangrene, and pyæmia were a daily experience and emptied the operating theatre ward of its occupants time after time. Curiously enough the experiences of the present war have introduced the Listerian-trained surgeons to some extent to the older experience; wounds, they complain, are often septic before the injured man reaches even the casualty clearing station. Such a state of things to a surgeon who has not seen the older order of things is an experience which astonishes him and confuses his judgment, founded as it has been on aseptic surgery. It is disconcerting in the extreme, and it cannot be said that he can get much information from the older men as to what should be done when erysipelas, gas gangrene and the many phases of wound poisoning occur. The older man merely stood by and watched, treated symptoms as they arose, and continued poulticing and trying to limit the spread of erysipelas by drawing a pencil of nitrate of silver above the infected part in the hope of staying its spread.

An interesting question of the disinfection of wounds has come to light lately, that is, the potency of disinfectants to change an already septic wound into a clean wound by syringing with any one of the many disinfectants in vogue. Disinfectants are preparations possessing properties whereby germs are presumed to be destroyed. They are practically the same as those now used as antiseptics, namely, carbolic, iodine, mercury, lysol, cresol, and some one of the many allied substances in daily use. As an antiseptic they are used as a pre-operation means of removing all possibilities of wound infection, and as disinfectants they are used in the hope that an infected or septic wound may be disinfected and rendered germ free. Syringing discharging wounds with disinfectants was, it was hoped, effectual, or at least helpful in accomplishing this end. Recent opinion does not confirm this possibility if it ever was reckoned upon seriously. The exhibition at the Royal Academy of Medicine some two years ago proved the inability of disinfectants applied as above indicated to destroy germs by such means.

The most potent disinfectant syringed into a wound does not free the wound of infecting germs; it is a futile proceeding, annoying, and possibly harmful to the patient and to the wound, as it is useless from a surgical point of view, be the wound mopped out with a disinfectant, however potent. The consequence is that other methods have had to be invoked; they are continuous removal of the discharge from the wound, so that the germs are removed as soon as developed in the deeper tissues of the wound. In former days this was attempted and accomplished by a continuous drip on the wound from a bottle attached to a cradle over the wound, acting by syphonage. In the bottle was a solution of iodine or permanganate of potash. Curiously enough this has been reverted to at the Front in many instances, so much so that were a surgeon of forty years ago to revisit the Front he would find the drip-bottle of iodine in use to-day as it was in his days before the 'seventies came in with the modern ideas of surgical cleanliness. As in bacillary dysentery with its continuous outpouring of infective germs, the treatment obtains of purging by Epsom salts, so in the alimentary canal the same principles hold good as on the surface of the body, namely, washing away by the constant dripping method or by drainage the germs as they form in the wounds in hope of exhausting them, or at any rate preventing their accumulation to cause blood infection by their presence.

Much has been learned; so much, indeed, that we hope for definite ruling of how to deal with, and when to deal with injuries to the abdomen involving the viscera. When to operate and when to leave alone as affording a better chance to the patient have been perplexing questions for many a year. When the liver or the spleen is shot through or ruptured, when the stomach or intestines are perforated, what is the correct proceeding to adopt? Will these questions be settled, or will it result in "it-all-depends-on-the-case," without even headings for our instruction. Brain injuries should be fruitful in producing information for future guidance, not only as regards mere operations, but in their clinical aspects and sequelæ; "localization" ought to be advanced, as a bullet is a small intruder compared with the grosser lesions caused by a depressed piece of bone, which is always irregular and may spread over wide areas annulling all certainty of localization of definite brain spots.

Surely the united surgical talent of the world should give the science and art of surgery an epoch-making foundation. Let us hope that the result of all this experience will be devoted in some measure to "the science" as well as to "the art" of surgery, that the causes of failure will be enumerated and pathological states find a prominent place in the records. That the mere mechanism of operations will be relegated to its proper sphere, which if surgery is to be a science and not merely an art, must ever remain a secondary one.

Abstracts.

FAMILY EPIDEMIC OF SCARLET FEVER.[1]

By SATKARI GANGULI.

SCARLET FEVER is a widespread affection, occurring in nearly all parts of the globe and attacking almost all races. But India enjoys comparative immunity, as may be evident from the fact that seldom cases are reported in the Indian journals and periodicals, and the profession in general, as a rule, remains practically unconcerned.

Recently a paper on this subject was read by Colonel J. Garvie.

"For more than one reason it seems good to record an epidemic of scarlet fever in the United Provinces of India. As far as known they are not common. As the narrative proceeds it will be seen that the first case in a baby would never have been explained except for those that followed."

The following cases may afford a clue to the undiagnosed fever cases so frequently seen in all parts of India.

Case I.—An American baby, aged 1 year. She had had fever for some four days which had not yielded to homely remedies. The symptoms were listlessness, fretfulness, and a general appearance of being ill. A blood film was taken, and diaphoretic given before the blood had been examined. On the sixth day the temperature fell to normal, and there was a discharge from one ear. Naturally these two facts were connected together, and it was thought the course of the fever was due to infection of the middle ear. It was thought strange that the baby gave no sign of pain in the ear. There the case ended in an unsatisfactory way; so many do.

Case II.—The second case in the family was the

[1] Abstracted from the *Indian Medical Gazette*, January, 1918.

mother with fever and sore throat. Some months before diphtheria of anomalous character had appeared in the next house, and one could not rule out of court at once that this case was not of this nature. Anti-diphtheritic serum was given, but this disease was believed not to be the cause of the illness, because there was no marked swelling of the throat nor of the neck, no diphtheria-like patches on the mucous membrane, and no rapidity of pulse. The throat was merely swollen and sore. Dengue was then suspected. This disease had appeared in epidemic form in this part of the country three years before after a lapse of forty-two years. The lady was seen by an officer, who had dengue many times, and believed this to be the diagnosis. She was also seen by a civil practitioner, and pronounced to be a case of streptococci infection.

Meanwhile the pulse rose from 80 to 120, and the case became an anxious one. The rash became unlike any dengue rash. The skin was generally red, and all the flexures of the limbs were markedly affected.

In a day or so peeling set in, and the idea that this was a case of scarlet fever became assured for some days in one's mind.

Case III.—The only other child in the family then fell ill, and ran through a typical attack of scarlet fever. Rash, sore throat, fever, earache, peeling, all appeared as laid down in a text-book.

Case IV.—The head of the house, a man, aged 40, himself now fell ill. His case, as an example of an anomalous fever, is very interesting. He had little or no fever, only between 99° and 100° F., and a little sore throat for two days.

The origin is a mystery. The family are American. Did the infection arrive by letter from their homeland?

RAT-BITE FEVER TREATED BY INJECTIONS OF NOVARSENOBILLON.[1]

By GEORGE C. LOW,
AND
R. P. COCKIN.

RAT-BITE FEVER.—Sodóku of the Japanese—was recognized, quite a long time ago now, in Japan as a definite entity. In 1915 Futaki and his fellow-workers demonstrated the presence of spirochætes in the lymph glands of cases on the tenth to thirteenth day of the illness. Later they discovered in man, in the wound of the rat-bite and in the blood of inoculated mice, spirochætes. Long and short forms are the same species, the long ones being old and found almost exclusively in human tissues, while the short ones are the young forms, and can be found in the blood of patients with the disease and in experimental mice. Futaki's work has been confirmed by Kaneko and Okuda.[2]

[1] Abstracted from *Brit. Med. Journ.*, February 16, 1918.
[2] *Journal of Experimental Medicine*, September, 1917.

CASE.

Mr. H., aged 25, on January 31, 1917, when in East Africa, was bitten by a rat on the right forearm. This healed up and was practically gone when, some seven days later, pain commenced at the site and the place swelled up. Fever then appeared, and with this a rash broke out on the body. Later the glands in the right axilla enlarged, and following this a general adenitis was noticed. On the twelfth day after onset of symptoms, the bite, which had now broken down, was lanced, and some pus escaped. About the twentieth day severe joint and bone pains came on, and the throat also became inflamed and very sore. The condition improved, but quickly relapsed, and between that time and the present (January 31, 1918)—namely, a year—patient can count nineteen relapses at varying intervals. There was a severe one in May, 1917. The patient had also suffered from malaria, and it is not certain which of the two infections was responsible for the different bouts of pyrexia. Malarial parasites were found in the blood in August, 1917, during an attack.

Previous Illnesses.—Dysentery, much malaria (before the rat bite), never syphilis, no history of tick fever, as he has been in areas where it prevailed, and some of his friends had actually suffered from it; phlebotomus fever December, 1916.

First Examination.—The patient was seen first by one of us (G. C. L.) on September 25, 1917. He was then fairly well, and was only complaining of getting tired easily and of headaches. He looked a little sallow, was slightly anæmic, the spleen was palpable, and the glands in the right axilla and in the posterior triangles of the neck were definitely enlarged. The urine was normal, the blood showed no malarial parasites, but there was a definite large mononuclear increase. A diagnosis of rat-bite fever and malaria was made, and the patient was instructed to present himself immediately if any signs of a relapse appeared.

Second Examination.—On December 10, 1917, he came again. On December 3 he had an attack of fever in the middle of the day, for which he had to go to bed; the temperature rose to 104° F. This attack responded to aspirin and quinine, but he still complained of pains in the glands and in the back of the neck with more or less constant headache. The glands in the neck areas were big and very tender to palpation. They were also easily palpable in the other areas. Dusky-coloured purplish-red eruption over trunk and neck and on the arm which had been bitten, its appearance being best described by the term blotchy. It was very typical of the eruption described in papers on this disease. Bones tender, no malarial parasites in the blood, no typanosomes, no spirochætes. Relapse of the rat-bite disease was diagnosed.

Treatment.—He came to hospital on December 17. The rash was then fading, but the glands were still tender and enlarged. We then decided that we should give him a course of novarsenobillon.

most the number of births was considerably in excess of the number of deaths. In some cases the births reached four times the number of deaths. On three estates only out of thirty-six did the deaths exceed the births. Several estates on which for ten years and more the deaths always exceeded the births have recently reversed this record under the influence of ample sanitary measures, coupled with quinine prophylaxis and special attention to hookworm infection.

Enteric Fever.

This disease shows signs of reduction. The cases notified throughout the colony for the year 1914 are 265, and in 1913 were 435 in number. Compulsory notification began on February 24, 1912. The number of deaths is 100, a decrease of six over last year.

Many vehicles of the infection no doubt at times play a part in the spread of this disease in British Guiana, but the social conditions and habits of the people are so favourable to spread by personal contact that little doubt can be entertained as to the great influence of this method. There is much epidemiological evidence which gives support to this view.

Prompt isolation and equally prompt disinfection of patients' premises alone offer prospect of success. In the city of Georgetown special efforts are made to carry out these measures, and the provision of a special isolation block at the Public Hospital has assisted greatly. The majority of all persons suffering from enteric fever in Georgetown are treated in the Isolation Hospital.

Tuberculosis.

This disease is gradually decreasing. It is still, however, much too frequent. In 1914 there were 499 deaths as against 531 for 1913.

As might be expected, the disease is most prevalent and most fatal in the city of Georgetown and the town of New Amsterdam. Unfortunately, however, every estate, village, and small hamlet also records deaths from this disease.

In the city special efforts continue to be directed to the gradual improvement of house accommodation. The dread of night air is a superstition which will disappear but slowly.

Eight years of work have been accomplished by the Society for the Prevention and Treatment of Tuberculosis, and the quiet and steady work of the two lady health visitors has done much to prevent infection of others and encourage the afflicted to fight the disease.

Malaria.

This disease shows a further reduction during this year. The death-rate per 1,000 persons living from malaria alone has fallen from 5·5 in 1911 to 3·1 in 1914.

In Georgetown much of the low vegetation has been cleared away from around the houses, tanks and barrels are in general screened, and the casual tins and bottles are repeatedly removed.

In New Amsterdam two sanitary inspectors are now at work, and superfluous vegetation is receiving attention. No attempt has yet been made to screen all tanks, vats, and barrels. Mosquitoes are still greatly in evidence.

In the villages little or no anti-malarial work is done. A start has been made by the Public Health Department with anti-mosquito and general sanitary measures. The work will gradually extend, but of necessity the progress is slow.

On the sugar estates excellent results have been achieved during the past few years. Simple sanitary precautions are enforced, including the abolition of mosquito breeding-places, screening of barrels and other receptacles, the free distribution of quinine to resident labourers, and especially to children.

In the towns and villages quinine is on sale at the post offices at cost price (duty free).

Efforts have been made to introduce the systematic use of quinine into the schools. In 1913 this measure was adopted in twenty-six schools; it has now extended to 106 schools. The total number of schools in the colony is about 230 in number.

Specially malarious districts have been selected for this distribution in preference to others. Both managers and head teachers have frequently given expression to the obvious benefit which results.

During this year for the first time an examination of children in the schools to ascertain the spleen rate has been carried out in some of the medical districts. In all 7,500 children of eighty-two schools have been examined, and the results show very much what was to be expected, viz., a high rate in the malarial districts and a low rate in the more healthy. The medical officers who carried out this work comment specially on the much greater tendency to splenic enlargements in the children of East Indian race as compared with those of black race.

All prisoners, members of the police force and their families, the boys of the Industrial School, the children at the Orphan Asylum, and attendants at Government institutions are supplied with quinine free.

Ankylostomiasis.

On the sugar estates the following measures are in force:—

(*a*) The provision of latrines on all estates which in the majority of cases are well used.

(*b*) The microscopic examination and treatment of all newly arrived immigrants from India. Of these, as a rule, 65 to 80 per cent. are found infected.

(*c*) The microscopic examination and treatment of all immigrants who attend at hospital, whether with symptoms of ankylostomiasis or not.

(*d*) On several estates a microscopic examination and treatment of all immigrants resident on the estate is gradually proceeding, and it is probable that in many the degree of infection is well below 20 per cent.

Severe types of ankylostome anæmia are now rarely seen; the milder type of infection with chronic degenerative changes is now often encountered, the principal fatality occurring amongst pregnant females too anæmic to survive the extra burden of child-birth.

In towns and villages no measures specially directed against the disease are in force. In villages the amount of infection is probably from 50 to 80 per cent.

The International Health Commission of the Rockefeller Foundation has elected to carry out a campaign to alleviate or eradicate this disease in British Guiana.

The Peter's Hall Medical District was selected for the first attempt, and the work has been carried on during the whole year.

The Belle Vue Medical District is now under treatment.

The work is systematic and thorough. Every single individual in the area selected is recorded by a special house-to-house census. Each individual is examined microscopically for infection and then duly treated with thymol.

The Peter's Hall campaign was closed on March 31, 1915. Including those persons known to live in the district, but untraced, those who refused treatment (very few), those who left while treatment was in progress, &c., and after allowing also for errors in microscopical diagnosis, it is found that 70 per cent. of the people are now free from infection, and that some 30 per cent. still are probably infected.

This was the first attempt to carry out such a wholesale systematic examination and treatment in the villages, though Dr. Ferguson had already for some years carried out an individual examination and treatment of all immigrants on the estates under his charge. In consequence many errors and mistakes arose which can be eliminated and better results may be expected from later campaigns.

At the Alms House in Georgetown every inmate has been examined, and if found infected duly treated with thymol. During 1914 the percentage of infection found was high, being 75 to 80 per cent. of those admitted. It is significant, however, that in the later recent months the percentage of infection is gradually falling, until in April and May, 1915, the percentage of infection has been 25 to 30 per cent. of those admitted.

In other institutions, such as His Majesty's Penal Settlement, Orphan Asylum, Onderneeming Industrial School, &c., similar systematic treatment is being carried on.

Infantile Mortality.

Much loss of life still occurs at ages below one year. The infantile mortality rate for the colony was 170 per 1,000 living births, and for the city of Georgetown 210. Both of these rates are lower than ever before recorded.

The principles of infant feeding are now taught by all female teachers in primary schools under the advice of the Government medical officer of the district. Special classes in this subject for female teachers and assistants are held in the hospital, Georgetown.

In March, 1914, was formed the Baby-Saving League, an organization which includes the principal members of the community, and has considerable funds at its disposal. In Georgetown, New Amsterdam, Peter's Hall, Belle Vue, and Buxton medical districts the League has established a clinic for mothers and babies, a system of visiting the mothers in their homes. In each district a trained nurse-midwife is subsidized and efforts made to establish her in the confidence of the people.

It is still early to report on the results of the League's measures, but the scope of its work is wide, and there is little doubt that its influence is beginning to be felt not only on the special problem of infant mortality, but also in correlated social problems.

Public Health Department.

This special department is now in the third year of existence. It proceeds of necessity slowly, but surely, and has an enormous area to cover and many years' arduous work before it. Attention to the prevention of disease is urgently required in British Guiana, and the direct benefit of remedial measures can be so easily and so readily accomplished.

during this time there had been no indication that his condition was in any way improving, the attacks of fever on the contrary being rather more severe and the accompanying symptoms rather more marked.

Considering that streptococci had been conclusively proved to be present in the axillary glands both by culture and by the inoculation of the gland tissue into mice, and also that the patient's serum had a marked power of agglutinating emulsions of this micro-organism, this streptococcus was regarded as the probable cause of the febrile attacks. A vaccine was therefore prepared from cultures of the streptococcus, and small doses were administered. This procedure was completely successful, the doses given being 5 million cocci on February 23, 1917, 8 million on February 27, 1917, and 10 million on March 3, 1917. None of these doses was followed by any reaction; on the contrary, during the ten days the patient remained in hospital after the inoculations were commenced the temperature was only once above normal (99·4° F.), and usually remained subnormal; the patient also stated that he felt much better, the pains in the limbs disappeared, and he was able to take a considerable amount of exercise without exciting any febrile attack.

The axillary wound healed by first intention. The patient left hospital, a dose of 10 million streptococci being given once a week during the first month, and afterwards at longer intervals.

The subsequent history of the case was uneventful: the febrile attacks never recurred, and when the patient was seen four months later he appeared in perfect health and had been carrying on his work for the last three months.

Summary and Conclusions.

(1) The case described showed the typical signs and symptoms of rat-bite fever—namely, intermittent paroxysmal attacks of fever; an inflammatory condition near the site of the original bite, occurring some time after its infliction and subsiding without suppuration; vague pains in the muscles and limbs; a dusky red, macular rash; enlarged lymph glands.

(2) None of the various micro-organisms which have been described as the causal agent of this disease, such as sporozoa, spirochætes, streptothrix, or tetragenus could be found, but the condition was regarded to be due to a streptococcus for the following reasons: (*a*) A streptococcus was isolated from glands removed from the right axilla—the right hand being the site of the primary injury—both by culture and by inoculation of the gland tissue into mice. (*b*) The patient's serum agglutinated emulsions of this streptococcus in dilutions of 1 in 160, whereas normal serum gave no agglutination in 1 in 10 dilution. (*c*) The administration of a vaccine made from this streptococcus was associated with immediate cessation of the febrile attacks and other symptoms.

(3) This streptococcus, which was only present in very small numbers in the axillary glands, was shown by its cultural reactions and by agglutination tests to belong to the *Streptococcus pyogenes* group. When first isolated it would only grow anaerobically, and its virulence for mice was not very high.

(4) General considerations point to the condition known as "rat-bite fever" to be due to bacteria, and it is probable that the future will show that streptococcus is amongst the commonest of these.

PUBLIC HEALTH ADMINISTRATION IN RUSSIA IN 1917.[1]

By C. E. A. Winslow.

Professor of Public Health, Yale School of Medicine; Member American Red Cross Mission to Russia.

(*Continued from p.* 68.)

Infant welfare work is more fully developed in response to the urgent need which exists for activity along this line, in Petrograd as everywhere in Russia. In 1915 one-quarter of the infants born in Petrograd died before reaching the age of one year (as against less than one-tenth in New York City, the excess corresponding to a loss of 6,000 lives a year). There is, however, the nucleus of an admirable organization of milk stations and baby clinics in Petrograd, one being maintained by the city itself, eight by the district dumas, five by the All-Russia Patronage for the Protection of Motherhood and Childhood, and twelve by other agencies. Between 5,000 and 6,000 children are cared for at these various stations. The number should be doubled or trebled. The work of existing institutions is at present seriously hampered by the grave shortage of milk. There was available last September only about one quart of milk for every thirty people in the total population, one-third of the quantity available before the War, and one-tenth of the amount deemed necessary by conservative food experts.

The birth-rate of Petrograd has fallen from 30·7 per 1,000 in 1907 to 24·9 in 1914 and 22 in 1915, in which year it fell below the death-rate (23·2 per 1,000).

In comparing these death-rates with those for Moscow, it appears that the prevalence of the acute contagia is much the same in the two cities, measles leading all the rest. Scarlet fever was much more prevalent in Moscow in 1915 than in Petrograd in 1914, but this was due to a special outbreak in the former year. On the other hand, the higher incidence of typhoid in Petrograd is characteristic and very possibly connected with imperfections in water purification, while dysentery is regularly higher in Moscow on account of its warmer climate and closer proximity to regions where this disease is very common. Cholera, which

[1] Abstracted from *Public Health Reports*, December 17, 1917.

has disappeared from Petrograd in recent years, still occurs periodically in Moscow. The fact that the diarrhœa and enteritis rate, while very high in Petrograd, falls short of the enormous figures reached in Moscow, is perhaps due in part to the cooler summer weather of the capital. Tuberculosis, on the other hand, appears to be far higher in Petrograd than in Moscow, the figures being 299·5 as compared with 191·1 for pulmonary and 54·4 as compared with 32·8 for other forms of tuberculosis. The combined rate for all forms of pneumonia and other respiratory diseases is lower in Petrograd, 387·4 against 405·4, so that better diagnosis may in some part account for the difference. It would be unsafe to stress this point, however, without a study of age distribution in the two cities, and we know that in our own country there are cities like Pittsburg which are actually characterized by low tuberculosis rates combined with a very high incidence of pneumonia.

The Central Bureau of Public Health.

There remains finally to be considered the Government bureau, which corresponds in many respects to our United States Public Health Service, a body which has been of some importance in the past, and which, as in our own country, promises to play a much larger part in the future.

The central bureau of public health was endowed, theoretically, with large powers before the Revolution, and had an inspector in each Province with ten or twelve sub-inspectors under him, in all a force of nearly 2,000 physicians. The central organization at present includes a division of administration; a division for the supervision of hospitals, medical schools, schools for feldschers, and the like; a division for sanitary and epidemiological work; a division for the supervision of mineral springs, medicinal bath, &c.; and a division of statistics.

The report for 1914 (the last which is in print) shows that in that year there were in the Empire —excluding Poland and the three Provinces of Vilna, Kovno, and Kholm—18,320 physicians engaged in civil practice, of whom 15,433 were men and 2,887 women. In the cities there was one physician to 1,700 inhabitants, and in the rural districts one to 23,000 inhabitants. Of medical assistants (feldschers, &c.), there were 25,310, of whom 18,577 were men and 6,733 women. There were 11,764 pharmacists, 4,706 physician-dentists, and 11,925 midwives. There were 4,287 medical districts under the direction of zemstvo or municipal physicians, and 4,952 additional points in charge of medical assistants.

For the same area (the Empire, exclusive of Poland and the three Provinces mentioned) there were 7,617 hospitals and dispensaries with 217,806 beds for civilian use. Only 39 per cent. of the hospitals had more than fifteen beds, 39 per cent. had six to fifteen beds, and 22 per cent. had less than six beds each, indicating the growth of small rural hospitals under the zemstvo medical organization. There were 3,349,083 patients treated in the hospitals during the year with a mortality of 4·5 per cent., and an average period of treatment of 19·4 days. Excluding obstetrical and psychiatric cases, there were 2,924,539 patients treated with a death-rate of 4·8 per cent., and an average period of treatment of sixteen days. Of maternity hospitals, there were 908 with 7,591 beds. In these hospitals there were 311,937 births in 1914, 83 per cent. of them normal, 6 per cent. premature, and 11 per cent. miscarriages.

The 4,791 registered pharmacies, registered in the area mentioned above, filled 32,412,972 prescriptions, for which they received 18,185,628 roubles, while they took in over the counter 13,816,025 roubles more.

Fifty-four hygienic laboratories for the analysis of food products were registered with the bureau, forty-four maintained by cities, two by zemstvos, one jointly by city and zemstvo, and the rest by Government bureaus or private agencies. Thirty-four of these laboratories were directed by physicians, nine by chemists, seven by veterinarians, and three by pharmacists.

There were thirty-two Pasteur stations in operation in Russia in 1914, in which 35,462 preventive treatments were given with ninety deaths. Excluding 3,490 cases not bitten, the mortality was 0·3 per cent.

As a result of the reconstruction called for by the Revolution, the central bureau of public health is likely to have, on the one hand, less theoretical power, and, on the other hand, more actual influence for good than it ever had under the old régime. The functions of legal and administrative medicine which it exercised in the past will no doubt be delegated to local authorities; but the central bureau will be in position to guide and develop local health work throughout the Republic with wisdom and success.

The future central organization will probably bear to the provincial zemstvo health administration much the same relation that the latter now bears to the district sanitary organization. There will be a large council of some 200 members chosen by the provincial zemstvos and the municipalities, with representatives named by the national Government. This council will hold plenary sessions two or three times a year, and will itself elect a small permanent council of some twenty members. The work of the administrative bureau will be directed by the permanent council, and sanitary legislation will, it is hoped, be enacted by the Provisional Government on its advice and suggestion. It will be the task of the council and the bureau to work out comprehensive plans for the development and standardization of medical and sanitary work throughout the Republic, and to provide as promptly as possible medical and sanitary care for those Provinces which at present have no zemstvo organization.

A proposed plan is outlined for the reorganization of the central bureau of public health, which has

liberty to open a medical school, and could grant their students diplomas, stating that they were qualified to practise medicine and surgery. The gravest abuses had crept in, and in many cases men with practically no medical or surgical education imposed on the public and practised as fully qualified men.

This Act put an end to this, and now only schools and colleges recognized by Government are allowed to issue diplomas. A medical register has been opened, which is kept by the Bengal Medical Council of Registration, and only those on that register are allowed to grant certificates which are accepted by Government. The result has been most beneficial, and unrecognized medical schools have practically ceased to exist in Bengal.

One result of this has been to emphasize the need of more recognized medical schools and colleges in Bengal, and this need is receiving the attention of the Government of Bengal.

The Serological Department. — Lieut.-Colonel W. D. Sutherland, M.D., I.M.S., has carried on the work of this department with marked success during the past three years, and I am glad to say that owing to the good work done, this appointment was made a permanent one on March 1, 1916, the Imperial Government bearing the charge. Work is sent to this department from all over India.

A great deal of the work is naturally connected with medico-legal cases. During the past three years 11,330 articles were examined in connection with 4,303 medico-legal cases. Of these cases, 2,603 related to murder. It is now possible to tell the nature of the blood which produces a stain, and not only can a human blood-stain be distinguished as such, but with other blood-stains it is possible to tell what species of animal the blood came from.

The Wassermann blood-reaction test for syphilis is very frequently undertaken and has proved of great value. The work of this department has been thoroughly satisfactory.

School of Tropical Medicine and Hospital of Tropical Diseases.—The foundation-stone of this school was laid on February 24, 1914, and the building was completed in 1915. The staff for the school has been sanctioned by the Secretary of State, but it cannot be brought together until after the war. The equipment has been ordered but cannot be supplied at present for the same reason. In the meantime the Biological and Serological Laboratories of the Medical College have moved in and are in working order. A scheme has been drawn up to extend this building to the east, on the site now occupied by the old morgue. A new morgue has long been required, with out-offices and a mortuary chapel. A site for this purpose has been selected, but the building of the new morgue, and consequently the extension of the Tropical School, is held up for want of funds. This proposed extension is to consist of an out-patient department and School of Hygiene. The Indian Research Association, through the Director-General Sir Pardey Lukis, have offered a lakh of rupees towards this extension provided the Government of Beugal find a like sum.

Sir Leonard Rogers, having nad this scheme for a Tropical School accepted, next obtained permission to open a fund for building and endowing a hospital for tropical diseases. He met with great success, the foundation-stone of this hospital was laid on February 24, 1916, and is now practically completed, and he has money in hand for the furniture and equipment as well as a large sum for endowment.

In certain districts the Zamindars have done a good deal to help in providing medical aid. Most of the Zamindars of the district of Rajshahi, for instance, have provided dispensaries of their own. These dispensaries are reported to be generally well staffed, well equipped and well managed, and the medical work done in them is good. The Zamindar of Tushbhandar in Rangpur, who already supports one dispensary, is about to open another in a locality where it is very badly needed. The Raja of Chanchal in Malda, who maintains three dispensaries on his estate, has opened a fourth one, and placed it under Government supervision.

The Medical Missionaries also do a good deal in the way of relieving sickness. They have established dispensaries at several out-of-the-way places. Returns are submitted to this office by seventeen such dispensaries, of which seven are under the supervision of Government. Many of the dispensaries maintained by them do extremely good work.

I would here also call attention to the excellent Manikcheri Dispensary, which was built and handed over to Government in 1903 by the Mong Chief in the Chittagong Hill Tracts. This Buddhist Chief has ever since continued to take an active interest in this dispensary and subscribes handsomely to its upkeep.

Civil surgeons have as usual paid periodical visits to hospitals and dispensaries which are under Government supervision, and I have paid frequent visits to all the principal Calcutta institutions and have also regularly inspected all the district headquarter hospitals.

The Dufferin Hospital has, for the past few years, been charging a small fee from its out-patients with the object of helping its funds. This step has no

doubt led to a falling off in its out-door attendance during the past two years.

The out-door work of the Sambhu Nath Pandit Hospital has been greatly assisted in the past three years by the regular attendance of the ladies of the St. John Ambulance Association. They have done most useful work, greatly increasing the popularity of this institution.

Diseases.—Malaria as usual heads the list. It accounted for 24·69 per cent. of the total attendance during the triennial period.

The value of quinine in the treatment of malaria is being more and more appreciated by the public, as can be seen from the sale account of the Juvenile Jail, Alipore. The arrangement for the sale of quinine treatment to the poor has not proved satisfactory. The shopkeepers and patent medicine vendors have in certain cases taken advantage of the cheap rate at which Government sells these treatments, and have bought them in large quantities for retail, also a certain amount of peculation has taken place. The Sanitary Commissioner is now investigating this matter. The question of the intravenous injection of solutions of various quinine salts and other drugs is now being studied, and I hope that the next triennial report will show great results. It is possible that a complete cure may be discovered for malaria through this method; the new drug Flavine has not yet come to India, it may prove useful

Calcutta was visited by a somewhat severe outbreak of cholera in 1914. In the following two years the incidence was much reduced and attended by death-rates which were the lowest for the last seventeen years. Outside Calcutta the epidemic was severe in 1915 and carried away 129,067 people; in 1914 the deaths numbered 87,241, and in 1916 69,501. The hospital attendance was in agreement with the above statistics.

Sir Leonard Rogers's method of saline injection treatment is being more generally employed. Arrangements have been made for training all our assistant and sub-assistant surgeons in this method of intravenous injection and the necessary apparatus is being provided.

Small-pox.—As far as Calcutta is concerned, this disease breaks out in an epidemic form once in five or six years The years 1914 and 1915 were epidemic years, and the mortality among the general population from this cause rose to 1,038 and 2,560, respectively, accompanied by a corresponding rise in the attendance at the hospitals. In 1916 there were only 58 deaths from small-pox among the general population, and 73 cases treated in hospital.

During the past three years the total number of plague cases in Calcutta has been 737, and of deaths 711. An interesting feature of the plague statistics for the past triennium is the large percentage of bubonic cases and the almost total absence of the pneumonic type. There were only 8 plague patients: 4 in 1915, and 31 in 1916.

Tubercle of the Lung.—During the period under report, the death-rate in Calcutta per mille has been 2·4 in 1914, 2·1 in 1915, and 1·9 in 1916, against 2·5 per mille in 1913. I cannot explain this reduced incidence; it is probably accidental. In 1914, 1,517 cases attended hospitals in Calcutta, 1,834 in 1915, and 2,447 in 1916. This seems to show that the people are paying more attention to this disease.

The question of the best means of dealing with tuberculosis in Calcutta is still under discussion. I am glad to say that the proposal to open, indiscriminately, a number of "tuberculin dispensaries" has been dropped. Personally I do not think that any great advance will be made in combating this or other contagious diseases, such as malaria, cholera, dysentery, hook-worm, &c., until hygiene is not only systematically taught in *all* Indian schools, but is also made a subject for *matriculation* at our Universities. It is the most important subject in the world, and hitherto the most neglected. The man who can enforce this will have done an incalculable amount of good to India.

Affections of the eye are one of the most common ailments in this Presidency; attendance on this account is rapidly increasing.

There were altogether 69,681 patients treated in this Presidency for venereal diseases in 1914, 71,032 in 1915, and 77,998 in 1916. It is impossible to say whether the increased attendance is due to an increase in the number of venereal patients in the Province or to the greater readiness in coming for treatment to the public hospitals. But there is some reason to believe that venereal diseases are on the increase. They are naturally most prevalent in large cities and towns, and in rural areas they are more prevalent in those places which are in most frequent communication with the towns.

There was a very large increase in the attendance for kala-azar last year. The increase was probably due not only to more accurate diagnosis, but to the splendid results which have attended the treatment by intravenous injection of tartar emetic, the percentage of deaths being 11·4. This low death-rate is undoubtedly due to the new method of the treatment, and this is one of the greatest advances in medical treatment which has been recorded in recent years.

Altogether 2,209 leper patients were treated in the Presidency last year. Dr. Heiser, of the Inter-

disinfection of places and fomites. In current practice, however, terminal disinfection still occupies a very large place in municipal sanitation, a condition to some extent justified by the danger of insect-borne diseases, such as typhus and relapsing fever. The success with which these latter diseases are controlled in the larger cities is a credit to Russian sanitary science. In certain parts of the country, however, these diseases, and particularly malaria, constitute grave public health problems which must be dealt with in the future.

Small-pox vaccine should obviously be used far more extensively than at present. Scarlet fever is much more serious than with us, in spite of the rather common treatment with streptococci vaccines.

Considerable attention is devoted to food inspection, mainly along chemical lines. The supervision of milk supplies is, however, in its infancy. There is little farm inspection, and practically no bacteriological control.

Medical inspection of schools is general and well developed, the school doctors in many districts undertaking the care of the sick children in their homes as well as diagnosis in the school. School nurses are not, however, utilized as with us, and public health nursing in general is a problem for the future.

There are schools for training public health workers in Petrograd and in Moscow, the former at the clinical institute being the most fully developed. The course at this institute is a post-graduate course of three months' duration with about eight hours of lecture and laboratory work a day, or 656 hours in all.

Perhaps a hundred students a year on the average took the course before the War, 15 to 20 per cent. of them being women.

The most important future developments of public health, in Russia, as elsewhere, must be along educational lines in connection with the three major problems of venereal disease, tuberculosis, and infant mortality, for it is here that the great harvests of disease prevention are to be reaped, and here that least has so far been accomplished.

In Petrograd Dr. Haffkine has opened six venereal clinics for medical and prophylactic treatment, but in many parts of the country, particularly in Siberia and in the Caucasus, the lack of medical care makes this problem a very difficult one. The War, as everywhere, has increased venereal disease to a very serious degree.

The anti-tuberculosis campaign is still in its infancy in Russia. The Red Cross did some anti-tuberculosis work before the War, and there are a few sanatoria, but very few in proportion to the need. Petrograd has only one poorly organized tuberculosis clinic. It is probable that the Russian has a high natural resistance to tuberculosis; and this fact, combined with the rigorous examination of recruits for the Army, has prevented any such shocking increase as has taken place in France, in spite of the peculiarly insanitary conditions under which so many Russian troops are housed in peasant dwellings behind the Front. There is little doubt, however, that tuberculosis is more prevalent, in both the civil and military population, than is commonly recognized or than is indicated on the face of the statistics. "Chronic pneumonia" is a commonly reported cause of death even in the Army. A vigorous and comprehensive anti-tuberculosis campaign will be certainly one of Russia's first problems after the War.

The largest single task of public health in Russia is, however, the control of infant mortality. There are approximately 1,500,000 infant deaths in Russia every year, of which two-thirds should be preventable according to such standards as have been set in New York City. Even allowing for the economic difficulties which must interfere with pre-natal precautions and infant care among the Russian peasants, it seems certain that a comprehensive campaign for the prevention of infant mortality could save half a million lives a year in Russia. The admirable infant welfare stations of Petrograd and Moscow and those maintained elsewhere need only to be multiplied throughout the Republic, and supplemented by the organization of a staff of visiting nurses for domiciliary education in order to solve the problem satisfactorily.

From the standpoint of administrative procedure there are two points about Russian health organization which are peculiarly favourable for future progress.

In the first place, one is impressed with the possibilities of the numerous advisory boards, made up largely of active employees, with which both zemstvo and municipal executives are surrounded. Such organizations must often prove cumbrous and time-consuming, but they tend to favour initiative and *esprit de corps* on the part of the staff. It is interesting to note that even before the Revolution Russia was in this respect in position to give a lesson in democracy to the rest of the world.

The strategic point in the Russian health situation is, however, the remarkable development of social medicine along curative lines and the consequent close connection between curative and preventive work. Russia, on account of the peculiarly acute needs of her rural population, has already developed the State care of the sick to a point of which we are only beginning to dream, and after the War the new Republican Government will no doubt pursue this social ideal to a much higher point of perfection. The opportunity for developing preventive educational work in connection with such a system is practically unlimited. In connection with infant mortality, for example, the high proportion of deliveries in maternity hospitals (in Petrograd nearly half of all births) is a most favourable circumstance. We may therefore look in the future, as zemstvo and municipal medicine develop and acquire the educational and preventive quality which is in accord with modern progress, for unprecedented successes in the control of preventable disease in the great sister Republic.

Original Communications.

SOME EXPERIMENTS WITH THE FRUIT OF *BLIGHIA SAPIDA* IN NIGERIA.

By A. Connal, M.D.
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AND
W. Ralston, B.Sc.
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The paper read by Dr. H. H. Scott [1] before the Society of Tropical Medicine, London, describing his work on "Vomiting Sickness" in Jamaica, gave rise to the query, in the discussion which followed, "Does the ackee exist in West Africa?"

The answer had already been supplied by Dr. J. M. Dalziel [2].

Blighia sapida is indigenous to West Africa. There are numerous fruit-bearing specimens in and around Lagos. The local (Yoruba) name of the fruit is "isin." It is freely eaten by the natives, either raw or cooked, and some Europeans also consume it.

There is a suggestive Yoruba "saying" that "he who knows to eat the isin knows to remove the poison." Although there has not been any reason to suspect the occurrence of outbreaks of "vomiting sickness" in West Africa, it appeared advisable to ascertain whether or not the "isin" possesses the poisonous properties ascribed to the "ackee."

The conditions in Nigeria differ from those existing in Jamaica. There is no trade in the fruit. Very occasionally a basket of "isin" is seen exposed for sale in the various markets, but, for all practical purposes, it may be accepted that the fruit is eaten only by those who collect it themselves from an easily accessible tree. Further, it appears to be the general custom to eat only the "arilli," discarding husk, seeds and "placentæ." The fruit ripens in April of each year. The experiments now to be described were undertaken in April, 1917, and completed in May, 1917. Four stages of the full-sized fruit were used: (1) Unripe, with seeds still green. (2) Unripe, with seeds black. (3) Ripe (as eaten). (4) Over-ripe.

Seven series of experiments were carried out before the fruiting season finished. The animals chosen for use were native puppies.

First Series of Experiments.

Extracts were made from the following parts separated from the other parts of the fruit: (*a*) Placenta (so-called "poison part"). (*b*) Arilli (so-called edible part). (*c*) Husk (a thick fleshy covering). These extracts were made by boiling for half an hour in tap water, straining off the solid residue, and finally concentrating the resulting liquor to a bulk suitable for administration to the puppies.

Extract No. 1. Placentæ from five ripe isin.

Dog I. Weight, 2,550 grm. Weight of placentæ, 2 grm. Concentration of extract, 25 c.c.=placentæ of one isin. First dose, 12·5 c.c. by the mouth, 10 a.m., April 10, 1917; second dose, 12·5 c.c. by the mouth, 2 p.m., April 10, 1917. Result: No apparent ill-effects.

Extract No. 2. Husks from five ripe isin.

Dog II. Weight, 1,800 grm. Weight of husks, 139 grm. Concentration of extract, 50 c.c.=husks of one isin. First dose, 25 c.c. by the mouth, 10 a.m., April 10, 1917; second dose, 25 c.c. by the mouth, 2 p.m., April 10, 1917. Result: No apparent ill-effects.

Extract No. 3. Placentæ from three over-ripe isin.

Dog IV. Weight, 1,315 grm. Weight of placentæ, 2 grm. Concentration of extract, 25 c.c. =placentæ of one isin. First dose, 8 c.c. by the mouth, 10 a.m., April 11, 1917; second dose, 8 c.c. by the mouth, 10 a.m., April 12, 1917. Result: No apparent ill-effects.

Extract No. 4. Husks from three over-ripe isin.

Dog V. Weight, 1,030 grm. Weight of husks, 104 grm. Concentration of extract, 50 c.c.=husks of one isin. First dose, 17 c.c. by the mouth, 10 a.m., April 11, 1917; second dose, 25 c.c. by the mouth, 10 a.m., April 12, 1917. Result: No apparent ill-effects.

Extract No. 5. Arilli from three over-ripe isin.

Dog III. Weight, 1,440 grm. Weight of arilli, 22·5 grm. Concentration of extract, 25 c.c.=arilli of one isin. First dose, 8 c.c. by the mouth, 10.30 a.m., April 10, 1917; second dose, 9 c.c. by the mouth, 2.30 p.m., April 10, 1917. Result: No apparent ill-effects.

Dogs IV and V passed several belascarids per anum a few hours after the second dose of extract.

The average weight of a whole "ripe" fruit was found to equal 43 grm., and of an "over-ripe" fruit 51·5 grm.

Second Series of Experiments.

The placentæ alone were used. Thirty fruits of each stage, unripe green-seeded, unripe black-seeded, ripe and over-ripe were collected, and the placentæ removed. Each of the four extracts used in this series, therefore, was prepared from the separated placentæ of thirty fruits at the same stage of growth.

It had been found in the first series of experiments that the saponaceous character of the extracts rendered mouth-feeding a tedious and inexact method of administration because of the profuse frothing. In this second, and in all subsequent series of experiments, a suitable stomach-tube was used, ensuring rapid, easy and exact administration.

Extract No. 6. Placentæ from thirty unripe green-seeded isin.

Dog II, as before. Weight of placentæ extracted, 23 grm. Concentration of extract, 10 c.c.=placentæ from five isin. First dose, 5 c.c. by stomach tube,

11 a.m., April 16, 1917; second dose, 10 c.c. by stomach tube, 11 a.m., April 17, 1917. Result: No apparent ill-effects.

Extract No. 7. Placentæ from thirty unripe black-seeded isin.

Dog IV, as before. Weight of placentæ extracted, 38 grm. Concentration of extract, 10 c.c. =placentæ from five isin. First dose, 5 c.c. by stomach tube, 11 a.m., April 16, 1917; second dose, 10 c.c. by stomach tube, 11 a.m., April 17, 1917. Result: No apparent ill-effects.

Extract No. 8. Placentæ from thirty ripe isin.

Dog III, as before. Weight of placentæ extracted, 21·2 grm. Concentration of extract, 10 c.c. = placentæ from five isin. First dose, 5 c.c. by stomach tube, 11.30 a.m., April 16, 1917; second dose, 10 c.c., by stomach tube, 11.30 a.m., April 17, 1917. Result: No apparent ill-effects.

Extract No. 9. Placentæ from thirty over-ripe isin.

Dog I, as before. Weight of placentæ extracted, 27 grm. Concentration of extract, 10 c.c.=placentæ from five isin. First dose, 5 c.c. by stomach tube, 11.30 a.m., April 16, 1917; second dose, 10 c.c. by stomach tube, 11.30 a.m., April 17, 1917. Result: No apparent ill-effects.

Third Series of Experiments.

On the assumption that the native belief in the poisonous properties of the placenta are correctly based, mixed extracts were used in this and succeeding series.

Placentæ from green-seeded unripe fruits were boiled with arilli from (*a*) green-seeded unripe, (*b*) black-seeded unripe, (*c*) ripe, (*d*) over-ripe fruits. The placentæ for each extract were obtained from ten fruits and the arilli from other ten fruits in each case—that is, each extract was made from the parts of twenty fruits.

Extract No. 10. Placentæ from ten green-seeded unripe isin. Arilli from other ten green-seeded unripe isin.

Dog I, as before. Concentration of extract, 10 c.c.=placentæ from five isin. Arilli from other five isin. First dose, 10 c.c. by stomach tube, 11 a.m., April 19, 1917; second dose, 10 c.c. by stomach tube, 2.30 p.m., April 19, 1917. Result: No apparent ill-effects.

Extract No. 11. Placentæ from ten green-seeded unripe isin. Arilli from ten black-seeded unripe isin.

Dog II, as before. Concentration of extract, 10 c.c.=placentæ from five isin. Arilli from five isin. First dose, 10 c.c. by stomach tube, 11 a.m., April 19, 1917; second dose, 10 c.c. by stomach tube, 2.30 p.m., April 19, 1917. Result: Animal found dead 7 a.m., April 20, 1917. No signs of illness had been observed during April 19, 1917, up till 8 p.m. Thereafter the dog was not under observation until 7 a.m. of April 20, 1917, when the body was still warm and without *rigor mortis*. There were no signs of vomiting in the cage.

Post mortem, there were no signs of gastric irritation. The liver was of a yellowish-brown colour, and oozed profusely with blood on section. The kidneys were swollen and congested. Smears from the heart blood and the spleen were negative. Fatty cells were noted in the smears from the liver and kidney. Stained sections of organs. The liver showed considerable general engorgement of the blood-vessels and small hæmorrhages into the substance here and there. The nuclear staining was poor. Fatty degeneration was advanced and evenly distributed, practically all the hepatic cells showing this change. The kidney showed all the signs of an acute nephritis, with some fatty degeneration in the lining cells of the convoluted tubules. The spleen showed some engorgement.

The pathological changes in these three organs corresponded very closely with those described and figured by Scott [3].

Extract No. 12. Placentæ from ten green-seeded unripe isin. Arilli from ten ripe isin.

Dog III, as before. Concentration of extract, 15 c.c.=placentæ from five isin. Arilli from five isin. First dose, 15 c.c. by stomach tube, 11.30 a.m., April 19, 1917; second dose, 15 c.c. by stomach tube, 3 p.m., April 19, 1917. Result: No apparent ill-effects.

Extract No. 13. Placentæ from ten green-seeded unripe isin. Arilli from ten over-ripe isin.

Dog VI. Weight, 1,020 grm. Concentration of extract, 15 c.c.=placentæ from five isin. Arilli from five isin. First dose, 9 c.c. by stomach tube, 11 a.m., April 25, 1917; second dose, 15 c.c. by stomach tube, 11 a.m., April 26, 1917. Result: No apparent ill-effects.

Fourth Series of Experiments.

Placentæ from over-ripe fruits were chosen for boiling with the arilli of the four selected stages.

Extract No. 14. Placentæ from ten over-ripe isin. Arilli from other ten over-ripe isin.

Dog I, as before. Concentration of extract, 15 c.c.=placentæ of five isin. Arilli of five isin. First dose, 15 c.c. by stomach tube, 11 a.m., April 22, 1917; second dose, 15 c.c. by stomach tube, 3 p.m., April 22, 1917. Result: No apparent ill-effects.

Extract No. 15. Placentæ from ten over-ripe isin. Arilli from ten green-seeded unripe isin.

Dog III, as before. Concentration of extract, 15 c.c.=placentæ of five isin. Arilli of five isin. First dose, 15 c.c. by stomach tube, 11 a.m., April 22, 1917; second dose, 15 c.c. by stomach tube, 3 p.m., April 22, 1917. Result: Animal died 8 a.m., April 24, 1917.

This dog took his food and appeared to be in good health until within half an hour of death. No convulsions, no coma, no lethargy, no vomiting were observed. There was sudden collapse, and spasmodic twitchings were noted only in the agonal state.

Post mortem, the only macroscopical abnormali-

ties were a few linear ecchymotic areas in the gastric mucous membrane, a brownish-yellow appearance of the liver, and a swollen congested condition of the kidneys.

Microscopically, the pathological changes in the liver and the kidney were similar to those observed in Dog II, except that the inflammatory reaction in the kidney was more advanced.

Extract No. 16. Placentæ from ten over-ripe isin. Arilli from ten black-seeded unripe isin.

Dog IV, as before. Concentration of extract, 15 c.c.=placentæ from five isin. Arilli from five isin. First dose, 15 c.c. by stomach tube, 11.30 a.m., April 22, 1917; second dose, 15 c.c. by stomach tube, 3.30 p.m., April 22, 1917. Result: Animal died 10 a.m., April 24, 1917.

As with Dog III, no signs of illness were detected until within half an hour of death, when general twitchings and occasional tetanus-like movements were observed.

At the post-mortem examination a brownish-yellow colour of the liver and a congested kidney were noted.

Histologically, the cell changes corresponded to those found in Dogs II and III, but there were also small hæmorrhages in the spleen.

Extract No. 17. Placentæ from ten over-ripe isin. Arilli from ten ripe isin.

Dog V, as before. Concentration of extract, 18 c.c.=placentæ of three isin. Arilli of three isin. First dose, 18 c.c. by stomach tube, 11.30 a.m., April 22, 1917; second dose, 18 c.c. by stomach tube, 3.30 p.m., April 22, 1917. Result: No apparent ill-effects.

Fifth Series of Experiments.

This series was a repetition of the third and fourth series, except that placentæ from black-seeded unripe fruits were used.

Extract No. 18. Placentæ from ten black-seeded unripe isin. Arilli from ten green-seeded unripe isin.

Dog VIII. Weight, 2,160 grm. Concentration of extract, 6 c.c.=placentæ of one isin. Arilli of one isin. Dose, 30 c.c. by stomach tube, 10 a.m., April 28, 1917. Result: No apparent ill-effects.

Extract No. 19. Placentæ from ten black-seeded unripe fruits. Arilli from other ten black-seeded unripe fruits.

Dog VI, as before. Concentration of extract, 6 c.c.=placentæ of one isin. Arilli of one isin. Dose, 30 c.c. by stomach tube, 10 a.m., April 28, 1917. Result: No apparent ill-effects.

Extract No. 20. Placentæ from ten black-seeded unripe isin. Arilli from ten ripe isin.

Dog VII. Weight, 1,020 grm. Concentration of extract, 6 c.c.=placentæ of one isin. Arilli of one isin. Dose, 30 c.c. by stomach tube, 10.30 a.m., April 28, 1917. Result: No apparent ill-effects.

Extract No. 21. Placentæ from ten black-seeded unripe isin. Arilli from ten over-ripe isin.

Dog I, as before. Concentration of extract, 6 c.c.=placentæ of one isin. Arilli of one isin. Dose, 30 c.c. by stomach tube, 10.30 a.m., April 28, 1917. Result: No apparent ill-effects.

Sixth Series of Experiments.

The extracts used in this series were the same as in the fourth series, except that the placentæ were not only over-ripe, they had been allowed to turn soft and nearly black. They have, therefore, been termed "decayed" to distinguish them from the "over-ripe" of the fourth series.

Extract No. 22. Placentæ from five decayed isin. Arilli from other five decayed isin.

Dog I, as before. Concentration of extract, 6 c.c.=placentæ of one isin. Arilli of one isin. Dose, 30 c.c. by stomach tube, 10 a.m., May 1, 1917. Result: Animal died 9 a.m., May 2, 1917. As with Dogs III and IV, no signs of illness were observed until there was sudden collapse with general convulsions about half an hour before death. Post mortem, a few streaks of altered blood were seen adhering to the gastric mucous membrane, and the liver and kidneys were congested, the former being of a yellowish-brown colour. Microscopically, the pathological changes were similar to those found in Dogs II, III and IV.

Extract No. 23. Placentæ from five decayed isin. Arilli from five ripe isin.

Dog VIII, as before. Concentration of extract, 6 c.c.=placentæ of one isin. Arilli of one isin. Dose, 30 c.c. by stomach tube, 10 a.m., May 1, 1917. Result: No apparent ill-effects.

Extract No. 24. Placentæ from five decayed isin. Arilli from five black-seeded unripe isin.

Dog IX. Weight, 2,135 grm. Concentration of extract, 6 c.c.=placentæ of one isin. Arilli of one isin. Dose, 30 c.c. by stomach tube, 10.30 a.m., May 1, 1917. Result: No apparent ill-effects.

Extract No. 25. Placentæ from five decayed isin. Arilli from five green-seeded unripe isin.

Dog VII, as before. Dose, 30 c.c. by stomach tube, 10 a.m., May 8, 1917. Result: No apparent ill-effects.

Seventh Series of Experiments.

The extracts used here were repeats of extracts previously used.

Extract No. 11A, a repeat of No. 11. Placentæ from ten green-seeded unripe isin. Arilli from ten black-seeded unripe isin.

Dog VI, as before. Concentration of extract, 15 c.c.=placentæ of five isin. Arilli of five isin. First dose, 15 c.c. by stomach tube, 10 a.m., May 3, 1917; second dose, 15 c.c. by stomach tube, 2.30 p.m., May 3, 1917. Result: Animal died 9 a.m., May 4, 1917, under the circumstances described for Dogs II, III and IV.

Macroscopically, the post-mortem findings also were the same, except that there were numerous petechiæ on the serous surfaces. Histologically, the inflammatory changes, with fatty degeneration,

previously described, were present in the liver and kidney.

Extract No. 14A: a repeat of No. 14, except that arilli and placentæ from the same fruits were used. It was also the same as No. 22 in that the placentæ were decaying. Placentæ and arilli from ten decayed isin.

Dog I, as before. Concentration of extract, 30 c.c.=placentæ and arilli of five isin. First dose, 30 c.c. by stomach tube, 10 a.m., April 25, 1917; second dose, 30 c.c. by stomach tube, 10 a.m., May 26, 1917. Result: No apparent ill-effects.

Extract No. 15A, a repeat of Nos. 15 and 25, and only differing from the former in that the placentæ used were distinctly decayed. Placentæ from ten decayed isin. Arilli from ten green-seeded unripe isin.

Dog VIII, as before. Concentration of extract, 15 c.c.=placentæ of five isin. Arilli of five isin. First dose, 15 c.c. by stomach tube, 10 a.m., May 3, 1917; second dose, 15 c.c. by stomach tube, 2.30 p.m., May 3, 1917. Result: Animal died 6.30 p.m., May 4, 1917.

There were obvious signs of illness for about eight hours previous to death. The animal was weak and tremulous and refused food, but no vomiting or convulsions were observed. Post mortem, the macroscopic and microscopic appearances were as already described.

Extract No. 16A, a repeat of Nos. 16 and 24, and only differing from the former in that the placentæ used were distinctly decayed. Placentæ from ten decayed isin. Arilli from ten black-seeded unripe isin.

Dog IX, as before. Concentration of extract, 15 c.c.=placentæ of five isin. Arilli of five isin. First dose, 12 c.c. by stomach tube, 10.30 a.m., May 3, 1917; second dose, 15 c.c. by stomach tube, 3 p.m., May 3 1917. Result: No apparent ill-effects.

Extract No. 22A, a repeat of No. 22. Placentæ from ten decayed isin. Arilli from ten decayed isin.

Dog IX, as before. Concentration of extract, 30 c.c.=placentæ of five isin. Arilli of five isin. Dose, 30 c.c. by stomach tube, 10 a.m., May 8, 1917. Result: No apparent ill-effects.

Extract No. 11B, a repeat of Nos. 11 and 11A. Placentæ from ten green-seeded unripe isin. Arilli from ten black-seeded unripe isin.

Dog VII, as before. Concentration of extract, 15 c.c. =placentæ of five isin. Arilli of five isin. First dose, 15 c.c. by stomach tube, 9 a.m., May 12, 1917; second dose, 15 c.c. by stomach tube, 1 p.m., May 12, 1917. Result: Animal died 7 a.m. Post mortem, there was some congestion of the gastric mucous membrane in the region of the œsophageal orifice. The liver was brownish-yellow in colour. The small intestine was choked with tæniæ. Histologically, there were the same changes in the liver and kidney as have been described.

Six puppies, at or about the same age and weight as the experimental animals, were kept as controls, sharing the same kind of food and the separate confinement in cages. None of these control animals died or showed any signs of illness.

Summary.

(1) It would appear that placentæ alone, arilli alone, and husks alone, from the fruit of *Blighia sapida* in Nigeria, made into an infusion with boiling water, are non-poisonous to native puppies.

In the case of placentæ, the infusion can be administered in considerable strength without causing obvious ill-effects.

(2) Mixed extracts, i.e., prepared from placentæ and arilli boiled together, caused the death of the puppies in the following instances:—

(*a*) Extract No. 11, consisting of placentæ from green-seeded unripe fruits and arilli from black-seeded unripe fruits, in two doses, each equalling the soluble watery extracts of the parts from five fruits, caused the death of Dog II within twenty-four hours. The result was confirmed with Dogs VI and VII. The liver and the kidney showed the characteristic changes due to "vomiting sickness," as described by Scott.

(*b*) Extract No. 15, consisting of placentæ from over-ripe fruits and arilli from green-seeded unripe fruits, in two doses, each equalling the soluble extracts of the parts from five fruits, caused the death of Dog III within forty-one hours. The result was confirmed with Dog VIII, the death occurring within sixteen hours.

(*c*) Extract No. 16, prepared from placentæ separated from over-ripe fruits and arilli from black-seeded unripe fruits, in a dosage similar to that in (*b*), caused the death of Dog IV within forty-three hours. The result was not confirmed with Dog IX, which showed no ill-effects after similar treatment.

(*d*) No fatal results were obtained, using extracts made from black-seeded unripe placentæ, and arilli from the two unripe, the ripe and the over-ripe stage of the fruit.

(*e*) Using decayed placentæ obtained from fruits which had ripened on a broken bough, and had proceeded to decay, a fatal result was obtained in Dog I by the use of Extract No. 22 prepared from decayed placentæ and decayed arilli. A single dose, representing the soluble watery extracts of the parts from five fruits, caused death within twenty-four hours. This result was not confirmed in the case of Dog IX, which received similar treatment.

(*f*) Collapse was sudden, and no signs of illness were detected until within half an hour of death in any of the animals except Dog VIII, which was obviously ill for about eight hours before death.

Vomiting was not observed in any of the cases. Convulsions only set in during the last few minutes of life.

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[1] H. Harold Scott. "The Vomiting Sickness of Jamaica." *Trans. Soc. Trop. Med. and Hyg.*, January, 1917, vol. x, No. 3, pp. 47-62.

[2] J. M. Dalziel. "Ackee." *Lancet*, No. 4,848, vol. excl, (No. 5 of vol. ii, 1916), July 29, p. 215.

[3] H. Harold Scott. "On the 'Vomiting Sickness' of Jamaica." *Ann. Trop. Med. and Paras.*, vol. x, No. 1, April, 1916, pp. 1-78.

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THE JOURNAL OF

Tropical Medicine and Hygiene

APRIL 15, 1918.

THE FUTURE.

WITH the universal expansion of ideas, increase of the means of communication, and world-wide demand for food, there is an increased demand for doctors. With the greater demand for doctors in Europe, for treatment as well as prevention of disease, for prevention of infant mortality, for sanitary and public health work, all these only indirectly concern those who are in practice in the Tropics, or who propose to practise there.

In very hot climates growth of food is more rapid and the cost of production less than in cooler climates, and also disease is more rapid in its course, more varied in its manifestations.

To allow a larger supply of food, means are needed to prevent and counteract the natural unhealthiness, by an increase in the number of doctors.

In India, in Japan, in Panama, increased study of medical problems has resulted in great material prosperity.

To consider all those who have laid the deep foundations of sound work in these countries, is to reflect on names held in revered memory in all countries; for medicine has no central home but, as time and circumstances call, goes wherever there is the greatest need.

As in the case of the late Fleming Mant Sandwith, born at Belgaum in the province of Bombay; he served in the Turko-Serbian and Russo-Turkish wars; later in Egypt, in 1883, he investigated the cholera epidemic, and became Vice-Director of the Egyptian Public Health Department, and was for fourteen years physician to the Kasr el Ainy Hospital at Cairo, and Professor of Medicine at the Cairo Medical School. He also served in the South African War, and was Consulting Physician to the troops in the Mediterranean during the present War. A true type of the beloved physician, a receiver of honours, though less than the honours of those who fill other professions, it is ever the lot of those who practise the healing art to receive less than they deserve. He had the divine gift of sympathy, delicate quiet lovingness to feel for others, to guard them from ills they knew not of.

Such can be the lot of many others, for with increased need of doctors out of England, and decreased facilities for satisfactory work in England, as the result of the panel system of the National Health Insurance, with the prospect of an even more unsatisfactory National Medical Service, there are many who will seek spheres of greater usefulness abroad.

India alone calls for thousands of doctors, and for many years has needed many more than at any period have gone there. With the experience gathered in various lands, those who leave the Army will be able to make a judicious choice of new homes for themselves, some for their families, to confer increased benefits of medicine on many countries, and so on the wide world. For the basis of food supply is health, and the foundation of health is a satisfactory medical service.

Though so much is disadvantageous to the country in the panel system, yet there is no reason why public medical service should not confer its benefits over wide areas, as in Russia, also in China, where the Custom House has attracted many who will ever be remembered as benefactors of that great country and of humanity at large.

But the choice of new work and new homes must not be made lightly, or inadvertently. All circum-

stances have to be considered carefully, and as much information obtained as possible, which requires time as well as suitable opportunities. The care devoted to a wise choice cannot be commenced too early, so that no mistakes are made; for some it will be well to seek homes far afield, while others will do well to settle in London and large centres, not a few will wish to enjoy in their native land well-earned rest from arduous labours, others must take their rest in warmer lands. All must redirect their lives into new channels, with fresh mental outlooks on life and professional problems.

Abstracts.

HYDATID PYOPNEUMOCYST OF THE LIVER.[1]

By M. H. Vegas.
Buenos Aires.

The cyst may remain without alteration for many years until it dies or undergoes different changes, some of which have not as yet been fully studied. Regarding these changes or degenerations, Stirling [1], of Melbourne, has given the best description, classifying them in four principal stages. (1) The turbid stage is caused by the death of the parasite, the liquid being rendered turbid by precipitation of the albumin. If daughter cysts are present their contents remain clear. (2) In the fatty stage the precipitated proteins are changed into fatty substances and the liquid becomes more turbid, finally assuming a butterlike consistency. The mother cyst acquires a gelatinous or gummy aspect and by shrinkage in size is thrown into folds. The daughter cysts also shrink and their contents first become turbid, finally undergoing a degeneration similar to that of the mother cyst. (3) In the stage of desiccation the liquid disappears, leaving a putty-like mass in which can be seen stearin, cholesterin, and, less frequently, Charcot's crystals. (4) In the stage of calcareous infiltration the entire cyst is sometimes transformed into a thick, hard mass, which, if it has been previously operated on, prevents it from closing. In one case where, after operating for hydatid cyst of the liver, a fistula appeared which persisted for many months. At a second operation the pericystic membrane was found transformed into a thick, hard, calcareous covering, exactly like a shell. Stirling also quotes an interesting case where it was necessary to use a saw to open a splenic hydatid cyst, to such an extent had the osseous transformation developed. At the same time that these degenerations of the cyst occur, the liquid which it contains may also undergo changes. Sometimes it assumes a dark red or a greenish tinge, due to the presence of bilirubin, which contains crystals. Further, there have been cases in which a papillomatous growth invades the cavity, projecting from the inner walls of the cyst. In other cases the mother cyst has disappeared and yet the daughter cysts have been exceedingly numerous, in one case 28,000 being counted. Last of all the cyst may suppurate. This suppuration may simply fill the cyst, or it may be accompanied by the production of gases. It is on account of this curious spontaneous transformation of the liquid they are known as *kystes gaseux du foie* and *kystes sonores du foie*. These gaseous cysts are classified in four groups: (1) Gaseous hydatid hepatic cysts ruptured into the bronchus; (2) gaseous hydatid hepatic cysts ruptured into digestive ducts; (3) gaseous hydatid hepatic cysts opened by operation; (4) gaseous hydatid hepatic cysts closed, which have never communicated with any hollow viscus or with the exterior. This latter constitutes the primitive gaseous hepatic cyst, and the three former the secondary gaseous hepatic cyst.

It is only since the end of the early part of the last century that these primitive cysts have been studied, being first observed in 1837, when a cyst had ruptured into the bronchus. Of four personal observations of pyopneumocysts, the first was a boy with this complication following upon an hydatid cyst of the convex face of the liver treated by the Australian method in 1905. There are two principal methods practised to-day. The first and older consists in draining the cavity after evacuating the liquid and removing the mother membrane; it is called marsupialization and was originated in France. Australia produced the second method as the eleetive treatment for clean cysts. It consists in extracting the mother membrane, leaving the sac, after occlusion, in the abdomen. At first, in a time when peritoneal infections were feared, marsupialization was used in every case, but little by little its application has diminished on account of the inconveniences which followed, bile discharges, suppurations, fistulas, &c. To-day its use is limited to cases of suppurating cysts and those having either a bile discharge, numerous daughter cysts or degenerated, rigid walls. The Australian method ought only to be employed in those cases where the cyst contains clear transparent liquid. In forty-six cases treated by the Australian method I have only had three deaths; one from bronchopneumonia, another following upon Pott's disease, and the third from a suppurating cyst which caused death by peritonitis in a case which presented multiple cysts of the liver. It is also used in cases where the contents were slightly bile tinged. In my opinion, considering the bile origin of cystic infection, this is dangerous.

One of the complications that may occur in an occluded cyst is the reproduction of the liquid and development of gases within, a phenomenon which I was the first to observe in my case, that of a boy who entered my ward on February 3, 1905. His history is as follows:—

Case I.—B. G., a boy, aged 11, Argentine. Hydatid cyst of the liver was diagnosed; he entered

[1] Abstracted from *New York Medical Journal*, February 23, 1918.

hospital February 3, 1905. Seven years ago he suffered from lack of appetite which coincided with strong intermittent pain in the right hypochondrium. The belly was soft, somewhat distended, but not excessively painful on palpation. Five years ago a small tumour was observed immediately under the ninth rib on the mammillary line that increased in size and was at times painful. The patient was submitted to home remedies throughout his illness, but the development of the tumour was in no way modified. Examination showed a well developed boy with scanty adipose tissue; respiration hurried; belly enormously distended; lower costal arches bulged outward, narrowing the base of the thorax. There was a well defined vaulted swelling of the right half of the thorax and of the right side of the abdomen. Palpation revealed a hard, smooth, rounded tumour occupying the right hypochondrium, the epigastrium, and part of the left hypochondrium, and having respiratory mobility. Throughout the tumour percussion gave dullness which merged into the liver dullness with a feeling similar to the sensation which percussion of a mass of gelatine would give. The lower border of the right lobe of the liver was sharp and irregular, and descended to the margin of the iliac fossa; the upper border reached the third rib, bulging out the costal arches; upon deep respiration this border descended about one centimetre. The skin over this region was tense and shiny, and contained some clearly seen engorged veins. Nothing abnormal was seen in the respiratory organs; the heart was displaced to the left, and its beats were felt outside the mammillary line.

February 16.—A superumbilical median laparotomy was done. An enormous tumour was reached occupying the whole of the right lobe and pushing the diaphragm in a pronounced convexity upward. The lower border of the liver nearly reaching the right iliac fossa was regular with granular surface. The cyst was incised, and a large quantity of sterile liquid, clear, colourless, and transparent, was drawn off. The mother membrane was removed and the cavity dried. The cyst was closed, the wall sutured in two layers, and Mitchell's agraffes were used for the skin. February 22. Mitchell's agraffes were removed. Healing was by first intention. Since the operation there was no fever and general condition was good. March 15. Dressings were removed; wound was perfectly cicatrized; liver returned to normal position; no sign of tenderness in the region operated. April 20. Examination revealed vaulted swelling of right hypochondrium, the scar being distended and raised. April 25. Marked dyspnœa and night sweats were noted, temperature 39° C. (102·2° F.). On palpation the heart was felt very much displaced to the left. The general condition was worse; the swelling of the hypochondrium had increased. A radioscopic examination showed the right diaphragm pushed up with a clear zone beneath; below this was a dark shadow bounded above by a horizontal line which changed in accordance with changes of the patient's position, as was seen in cases of pleural effusions. April 26. The cyst was again opened through the first wound, a large quantity of fetid gases and purulent liquid escaping; ample drainage was left. April 28. There was an abundant bile discharge, soaking the dressings. May 3. In spite of various treatments to which the cavity had been submitted, the bile discharge continued abundantly. July 2. The bile discharge still continued; general condition was visibly worse; there was excessive dyspnœa with fever and night sweats. Examination revealed dullness on the left side of the thorax, faintness of the vesicular sounds, bronchophony, and egophony. There was increase of cardiac dullness; the heart tones were very weak. In view of this bad condition a puncture was made, giving exit to a purulent liquid. August 1. In spite of two further punctures the patient grew worse; fever and night sweats continued. In this state of progressive exhaustion some bronchopneumonic foci appeared which caused death on August 11.

Post-mortem examination revealed bronchopneumonia of right lung; pulmonary atelectasis; fibrinous purulent pleurisy of the left side; fibrinous purulent pericarditis; myocarditis; fatty degeneration of the heart. Adhering to the diaphragm was an operated cyst of the liver, about the size of an orange, communicating by a sinus with the exterior.

In the same year, 1905, I published the statistics of my ward, and in dealing with the cases of hydatid cysts of the liver I wrote as follows: "In a case recently operated in the ward by the Australian method, and which seemed to be going on well, we submitted the patient to an X-ray examination, and on the screen we could see perfectly clearly that the cyst was filled with liquid which moved when the patient was shaken; also the radiograph showed the diaphragm pushed upward on the side of the cyst, the right side, and a large dark zone bounded by a horizontal line, as is seen in pleural effusions. We believe this to be the true criterion to know whether a cyst, operated by the Australian method, is cured or not."

In 1909 I observed my second case, and next year my third case, a boy, aged 14, who came from Tres Arroyos in the province of Buenos Aires.

Case II.—A. S. M., a girl, aged 14, from Uruguay. Hydatid cyst of the liver diagnosed; entered hospital February 28, 1904. Four or five months previously she had suffered from pains in the region of the right hypochondrium radiating toward the right shoulder, which gradually increased in intensity, and later were accompanied by a marked swelling at the site of the pain. She stated that she had not had any disturbance of the digestive organs, urticaria, or jaundice. Examination showed a well developed and nourished girl; right hypochondrium and epigastrium swollen and the lower costal spaces enlarged; no distended veins were apparent. Respiratory movements clearly defined extent of the swelling. Palpation showed that the liver was enlarged and had descended; the

lower border, which on the mammillary line was situated on the horizontal line passing through the umbilicus, was easily perceived by touch; it was of normal consistency with respiratory mobility and was not enlarged. There was no particular tenderness, and only upon strong pressure did the patient acknowledge pain. Percussion in the region occupied by the tumour gave complete dullness extending in a convexity upward with its extreme limit in the third intercostal space; on the axillary line this dullness reached to the fifth rib, descending on the scapular line to the horizontal line which passed through the tenth spinous apophysis. The lower limit coincided with the position of the lower border of the liver already described, and is two fingers' breadth over the umbilicus at the epigastrium. The upper limit was modified by deep respiration. There is no hydatid fremitus. Percussion and auscultation of the thorax and palpation and percussion of the spleen revealed nothing abnormal. Blood examination: 5,410,000 red cells; 14,400 white cells; 65 per cent. hæmoglobin; leucocyte count: polynuclear leucocytes, 74·66 per cent.; eosinophilic cells, 2·66 per cent.; lymphocytes, 19·66 per cent., &c. Nothing of note in the urine; reaction of antihydatid bodies positive. Radioscopic examination revealed the diaphragm bulged convexly upward, reaching nearly to the third rib; this convex line was greatly accentuated by respiration.

March 1. A superumbilical median laparotomy was done. The cyst was punctured with a trochar. One and a half litres of clear greenish liquid were drawn off. The cyst was immediately incised and the mother membrane removed. The liquid, slightly bile stained, did not interfere with the complete closure of the cavity, since it was kept dry by wiping during the suture. The wall was closed in two layers and the cyst attached to the peritoneum. March 2. Temperature normal; pulse, 100; tongue, moist; general condition, good. March 3. No change. March 4. Temperature rose to 39° C. (102·2 F.), and pulse to 120; tongue furred; pain in the epigastrium; slight frontal headache. The dressings were removed; wound was in perfect condition. An enema was given, lowering temperature to 38° C. (100·4° F.). March 5 and 6. The temperature was about 38° C.; pulse, 100 to 120; the epigastric pain had disappeared, and the headache had only come on very slightly at night. Saline purgative was given on the 6th. March 7. Patient woke feeling perfectly well.; temperature and tongue normal; pulse, 90. March 8. Temperature and pulse were normal; the stitches were removed; healing was by first intention. There was no tenderness in the region operated, in spite of pressure exerted to discover pain. March 20. Condition continued very good; nothing abnormal in the hepatic region. March 22. Patient left the hospital at her own request. April 2. She presented herself again in a state of dyspnœa with temperature 38·7° C. (101·6° F.) and pulse 130; general condition bad; cyanosis and epigastric pain. The belly was swollen, especially in the epigastric region, the scar of the recent operation being slightly distended. The lower right thoracic region was raised and the skin tense and shiny. Palpation was easy, especially in the lower half of the abdomen. Percussion gave tympanic sonority throughout the swollen part; the lower intercostal spaces on the right were distended and painful; there was no elasticity. In a sitting position percussion gave an outline of absolute dullness merging into that of the hepatic region, its upper limit reaching the edge of the fourth rib; above this there was tympanism, entirely different to the pulmonary sonority which was observed throughout the swollen region when in dorsal decumbency. The changing of the patient's position caused intense dyspnœa and marked cyanosis. The heart was pushed upward and displaced to the left; its tones were normal; examination of the lungs revealed nothing of importance. There were amphoric and metallic sounds and a hippocratic sound that could be heard at some distance; there was slight icteria and a small quantity of bile pigment in the urine. Blood examination: 4,000,000 red cells; 19,000 white cells; 50 per cent. hæmoglobin. Leucocyte count: polynuclear leucocytes, 72 per cent.; transitionals, 4 per cent.; lymphocytes, 19 per cent., &c. Under the X-rays a dark shadow was seen reaching to the fourth rib, the upper limit of the hepatic dullness on the mammillary line, topped by a horizontal line above which appeared a clear, cupola-shaped zone, more transparent than the normal lung, which was pushed upward by the bulged diaphragm. Whatever the patient's position, the liquid remained in the lower part with the clear zone always above it. This examination again produced intense dyspnœa and marked cyanosis.

April 2. The patient was placed on the table in a sitting position and a puncture made with a trochar in the dull zone, a little to the right of the old wound, only a small quantity of fetid gases and a few drops of liquid coming away. A syncope ensuing made it necessary to lay the patient flat, and therefore it was deemed advisable to make an incision through the former wound, an enormous quantity of purulent liquid and fetid gases smelling like sulphuretted hydrogen being evacuated. The opening was widened to allow of the complete emptying of the cavity, and a glass drainage tube was left. The patient was brought round by injections of ether, camphorated oil, &c., but in spite of this her general condition was not satisfactory. April 3. After a few hours' sleep the patient was able to speak a little and began to recover from the state of stupor into which she had fallen; by nightfall she was completely restored and her condition normal. April 5. The great quantity of liquid draining off necessitated two treatments daily; general condition improved. April 10. Treatment only once a day. May 28. The wound was completely healed; general condition good. June 28. Limits of hepatic region were again normal; no pain on palpation or percussion. X-rays revealed the limits of the diaphragm normal with

respiratory mobility. She left the hospital at her own request. Examined a month later, she was found to be in perfect health generally and had gained in weight since leaving the hospital.

CASE III.—C. L., a boy, aged 14, from the province of Buenos Aires. Hydatid cyst of the liver diagnosed; entered hospital April 4, 1910. Upon entry he complained of intermittent pain in the right hypochondrium, radiating toward the right shoulder; general condition good; natural functions normal. Examination showed a large swelling of the right hypochondrium, epigastrium, and left hypochondrium; skin tense, with distinct engorged veins. Palpation revealed a smooth rounded tumour continuous with the liver, the lower edge of which on the left mammillary line was two fingers' breadth below the costal margin. A compression, dividing the tumour into two unequal parts at the suspensory ligament, was clearly noticeable; pressure on one part raised the other. This huge tumour had respiratory mobility. There was a dull note on percussion which merged into the hepatic dullness and extended upward on the mammillary line, reaching the upper edge of the fourth rib. On the anterior axillary line it extended to the fifth rib, and on the scapular line to the angle of the omoplate. The lower border of the tumour, as palpation showed, was two fingers' breadth below the costal margin on the anterior axillary line and four on the mammillary line. On the median line the extraordinary wide gap, whose vertex was two fingers' breadth from the xiphoid appendix, was at once noticed. On the left side following the edge of the gap the tumour extended to the zone of splenic and cardiac dullness, into which it merged. There was no hydatid fremitus. Percussion on the anterior face of the tumour was transmitted in waves to the posterior face. Neither percussion nor deep palpation was painful. Blood examination: Red cells, 4,560,000; white cells, 9,800; hæmoglobin, 60 per cent.; polynuclear leucocytes, 64 per cent.; eosinophilic cells, 5·66 per cent.; lymphocytes, 22·66 per cent.; transitionals, 7·66 per cent. Urine examination showed nothing abnormal; reaction of antihydatid bodies was positive. Under the X-rays the diaphragm was seen to be pushed upward in a pronounced convexity, moving freely with respiration, especially on the right side.

April 4.—A supermbilical median incision 8 cm. long was made; the peritoneum was opened and a tumour, strangulated by the suspensory ligament, was found. The left angle of the colon was adherent to the corresponding part of the tumour. A puncture was made with the trochar, and two litres of clear, slightly lemon-coloured liquid was drawn off, and the cyst immediately incised, an enormous mother membrane being removed. The cavity was dried, and the cyst sutured and fixed to the parietal peritoneum. April 6. Favourable results; temperature and pulse normal. April 10. Mitchell's agraffes removed, the wound being perfectly healed; hepatic region appeared to be quite normal, giving grounds for assuming a definite cure. April 16. Temperature and pulse normal; slight pain in the epigastric region. An examination revealed a swelling of the epigastrium and right hypochondrium, percussion giving a slight tympanic sound but no pain; condition of the wound was perfect. April 18. Temperature was normal; swelling increased, with pain radiating to the right shoulder; no dyspnœa nor displacement of heart, the apex beat being in the normal position. In dorsal decumbency the swollen zone had a slightly tympanic note on percussion; in a sitting position there was dullness extending to a horizontal line passing through the xiphoid appendix and above this line tympanism extending to the fourth right intercostal space. The relation between the dull and tympanic sounds changed with the different positions. There were distinct hippocratic, amphoric, and metallic sounds. Urine examination revealed nothing important. The X-rays showed a dark shadow topped with a horizontal line over which was a clear cupola-shaped zone, into which the liquid splashed when the patient was shaken. This clear zone altered according to the patient's position. The diaphragm moved up and down, but less, apparently, on the right side. April 18. Puncture and aspiration with Potain's apparatus were done, the patient being in a sitting position; 800 c.c. of frothy, odourless, mahogany-coloured liquid; albumin, 32 per mille; urea, 3·78; phosphates, 0·80; chlorides, 2·85; no micro-organisms were present, but in spite of this cultures were taken.

April 19. Temperature and pulse normal; general condition good. April 20. The edges of the tumour remained at the limits to which they were reduced by the incision. Temperature and pulse were normal. The cultures gave: aerobics, staphylococci, and coli; anaerobics; coli communis and streptococci. April 30. Examination revealed the upper border of the liver reaching the fourth intercostal space and the lower border slightly descended; palpation was painless and confirmed the limits shown by percussion of the lower border, which was slightly thickened. Under X-rays the diaphragmatic cupola was seen at its normal height, although a small clear zone was visible between the muscle and the liver. The patient left the hospital at his own request.

(To be continued.)

A NOTE ON THE TREATMENT OF HÆMOGLOBINURIC FEVER.[1]

By A. DUNLEY-OWEN, T.D B., S.A.M.C.

THE right diagnosis of this disease is most essential, as the use of certain drugs, e.g., quinine, may prove fatal, for hæmoglobinuric fever is a distinct disease, its causation is unknown, but it is not malaria.

[1] Abstracted from the *South African Medical Record*, February, 1917.

Of course, hæmoglobinuria does occur in malaria, and also after excessive doses of quinine, but in both of these forms of hæmoglobinuria jaundice is absent, whilst in hæmoglobinuric fever jaundice, hæmoglobinuria, and rapid onset of anæmia are constant.

Under no circumstances should quinine in any form be administered; dangerous results follow from even small doses.

The sheet-anchor in treatment is the administration of a mixture containing:—

R	Liq. hydrag. perchlor. ...	½ dr.
	Ammon. chlorid.	2½ gr.
	Sodii bicarb.	5 gr.
	Aq. ad	1 oz.

One ounce of this should be given every two hours until the urine is clear, and then continued every four hours.

Other symptoms to be dealt with as they arise are:—

(1) *Pyrexia.*—This generally subsides when the urine clears; and in cases of hyperpyrexia sponging is the best treatment.

(2) *Cardiac Failure.*—This is evidenced by sudden decrease in tension, and increase in frequency of the pulse. Is treated by hypodermic injections of $\frac{1}{100}$ gr. digitalin + $\frac{1}{60}$ strychnine sulph. every four hours. This is preferable to pituitrin, or to camphor oil, as the effect is more lasting.

(3) *Anuria.*—Diminution or suppression of urine is most successfully treated by rectal injections (in 6-oz. doses) of warm normal saline solution, repeated hourly until the excretion of urine is re-established.

It is not advisable to promote sweating, nor purgation, in such cases; indeed, it has been my custom to check excessive sweating by hypodermic injections of $\frac{1}{100}$ gr. atropin. sulph., and the patients have invariably done well.

(4) *Constipation* should be dealt with by simple enemata, and not by calomel or other purgatives by the mouth, as uncontrollable vomiting is sometimes so produced.

(5) *Vomiting* is most easily controlled by a draught of 2 oz. of soda water containing ¼ gr. cocaine hydrochlor. This is frequently successful when other remedies have failed.

The only food that should be given until the urine has been normal for two days at least is:—

(i) Barley water, sweetened, and acidulated with a little fresh lemon-juice.

(ii) Soda-water.

(iii) Stimulants (brandy or champagne) given in not larger doses than ½ oz. at regular intervals, or as often as may be considered advisable.

During the early days of convalescence milk, milk and soda-water, light maizena preparations, &c., may be cautiously given.

When convalescence is fully established, the diet may be gradually increased as the appetite improves; but great caution is necessary as to any exertion on the part of the patient; therefore, it is wise to detain him in bed for at least three weeks to a month.

The most suitable and least irritating tonic is:—

R	Ferri et ammon. cit.	5 gr.
	Tinct. nucis vom.	5 m.
	Aq. ad	1 oz.

This may be given thrice daily for a couple of months, and contains sufficient iron to help the general anæmia.

Arsenic in any form is liable to cause gastric catarrh, and retard convalescence.

QUININE IN THE TREATMENT AND PREVENTION OF MALARIA.

Sir Donald Ross, tropical adviser to the War Office, recently described the practical results obtained from treatment of malaria cases returned to England, at the Society of Tropical Medicine. The treatments adopted were classified into (*a*) "anti-relapse quinine prophylaxis," which was designed for preventing relapses as much as possible without attempting absolute and immediate cure; (*b*) "short sterilizing," which attempted absolute cure with treatments ordinarily continued only for a few days; (*c*) "long sterilizing, aiming at producing absolute cure by longer courses than those given in (*b*); and (*d*) mixed treatments, and treatments with drugs other than quinine. The criterion of success was the disappearance of relapses during the observation periods practicable; nearly all the cases were of malaria (mostly benign tertian) which was already of considerable duration, and only a very few cases were original infections. The treatment in each of the classes stated above comprised different salts and preparations of quinine, administered by the mouth, and by subcutaneous, intramuscular, and intravenous injection, in different doses and for different periods, to larger or smaller groups of patients. The result from all the quinine treatments taken together was represented by some 27 per cent. of ascertained relapsing cases in a total of about 2,500 patients. A control was afforded by 192 men who were watched without any quinine treatment at all, and of these eighty-nine relapsed within twenty-seven days, and seventy-six were presently judged not to be sufficiently well to allow of quinine treatment being withheld any longer; so that 86 per cent. of the untreated cases remained ill and 46·5 per cent. actually suffered from relapses during the period. It was found that short intensive treatment by large doses of quinine (for example, up to 180 gr. of sulphate or hydrochloride in three days) can, with rest, stimulants, and good after-treatment, be very well borne by the patient, and effect a substantial proportion of cures. The same can be said for doses in class (*c*), which in some instances totalled over 1,000 gr. in four weeks, large intramuscular doses being given during the first days of that period. But however

the doses were given in classes (*b*) and (*c*), the liability to relapse in patients receiving the treatment was not any less than in cases treated much less heroically under the method of class (*a*), by giving comparatively small doses amounting to about 60 gr. a week. This dosage gave the best results both in respect of the prevention of relapses and as regards the well-being of the patient, and that this dosage could be distributed in various ways without producing any marked difference. The amount should not, however, be less than a daily dose of about 10 gr., as this showed a marked superiority over smaller quantities. As a whole, the observers found no conspicuous advantage in any one of the three methods of administration of quinine, intramuscular, or intravenous, or by the mouth. Chemical examinations of urine point to a tendency for the excretion of quinine, in whatever doses given, to reach a concentration of 7 to 11 gr. per litre of urine, and do not favour the view that the drug is eliminated with a different degree of readiness when given by the mouth than when given by other methods.

These results, if they have failed to bring out any sensational short cut to the cure of malaria, give confidence in methods usually and conveniently employed, and enable the dosage for general use to be recommended on a substantial basis of recent differential experiment. The evidence that continued daily doses of only 5 gr. afford a relatively slight protection against relapse is important, and no doubt accounts for much of the disappointment which has been expressed at the results of the prophylactic use of quinine in this dosage in the malarious areas, where relapses are so common among the large proportion of the force which has become infected. Many now go further and hold that this practice has been proved useless as a preventive of malaria, not merely in the matter of cutting short relapses, but in the prevention of first or new infections; under this view it must be accepted that a man who has just been bitten by an infected anopheline cannot count on obtaining any protection from quinine in such doses, even when they are taken immediately after, or within a few hours of, the bite. It is urged, moreover, that the continued dosage of prophylactic quinine may do harm by lowering the response to the drug when actual attack occurs. The matter is of much practical importance. Instructions that anti-malarial measures in districts specially affected should include prophylactic daily 5-gr. doses of quinine have had behind them a measure of experience and authority much too great to be disregarded, and the medical authorities would rightly have been held to have failed in their duty if they had not pressed its use in those malarious regions where the circumstances prevent effective measures being taken to ward off mosquito-bite. Many think the failure of prophylactic use of quinine has been demonstrated.

Notes and News.

CHEAVIN'S "SALUDOR" FILTERS.

THE filtering medium consists of hollow cylinders made from selected grades of infusorial earth, the most efficient and rapid medium for the purification of water. The closeness and smoothness of the cylinder texture is most efficient in stopping germs and suspended matter, they are easily cleaned, and can be completely sterilized by boiling. Dysentery and other water-borne infections always threaten tropic residents, and now so many water-borne infections have been imported into Europe, consequently "Saludor" filters should be used in Europe as much as in the Tropics, for everywhere water contamination occurs.

CHINESE WOOD-OIL INDUSTRY.

ONE of the most important of Chinese products —and one for which Hankow acts as chief exporting centre—is t'ung-yu, or wood-oil, and the following interesting details of the industry are from a report by the United States Vice-Consul at Hankow:—

Wood-oil is obtained from two varieties of *Aleurites*, a small genus of the *Spurge* family. Each variety has rather sharply defined boundaries—the mu-yu shu, or wood-oil tree, being found for the most part in the southern provinces, while the t'ung-yu shu, literally tung-oil tree, is confined mainly to Central and Western China. By chemical analysis the oils of these two trees are found to be practically the same, but the t'ung-yu shu is of far more importance because of its greater hardihood and wider distribution. Fully nine-tenths of the so-called wood-oil exported from China is made from this variety.

The mu-yu is generally found in the Province of Kwangsi, near the city of Wuchow, which also acts as its chief market. Some of the oil is shipped to Hong-Kong, but the trade is not large.

The Yangtze Valley, especially in its upper reaches, is the territory in which the t'ung-yu tree flourishes most freely. The hilly country found in the gorge region, and, in fact, all the land from Ichang westward to Chungking, is particularly adapted for its growth. The plant is most often found on rocky hillsides, thriving on the poorest of soil so long as the annual rainfall is not less than 29 in. and the altitude not greater than 25,000 ft. The tree seldom exceeds 25 ft. in height, is rather ornamental, and has a great profusion of blooms in April. The fruit is about the size of a small orange, and contains three to five seeds not unlike shelled Brazil nuts in shape, although resembling more nearly the hickory nut in size.

The nuts are always gathered before maturity. As they are covered with a husk they are either parchd in iron pans or sieves over a fire, or else covered with straw or grass, under which fermentation takes place in the thin fleshy part of the fruit, thus allowing the nuts to be easily removed.

The methods employed for extracting the oil, although crude, are effective. After the seeds are removed from the husks they are placed in a circular stone trough, where they are crushed by a stone roller drawn by a buffalo, cow, or ass. The pulverized meal is partially roasted in shallow pans, then steamed over boiling water, the product meantime being placed in wooden vats fitted with wicker bottoms. The nuts are next placed in steel frames with straw as an outside container. The frames are arranged on edge in a press and pressure is applied. This is usually accomplished by means of a system of wedges which are driven in one after another by means of a huge battering-ram until the brown, watery, and odoriferous oil is crushed out into the vat below. As a rule the oil is then slightly heated and strained through a coarse grass cloth. (If the heating process is carried too far the oil becomes dark brown instead of retaining its desired light yellow colour.) The product is then placed in wicker baskets lined with varnished paper, and is ready for shipment. As a rule the oil yield is about 40 per cent. of the original weight of the kernels. The refuse matter, which is in the form of cakes, is used as a fertilizer.

In the vicinity of Hankow the native dealers allow the oil again to precipitate, drawing off the clear liquid and selling it to the foreign exporting firms. The residue is then sold to small dealers in Wuchang and Hanyang, who once more skim the oil after a further precipitation process. The oil is then sold to the native boatmen for use on their craft.

About the only variation in the above method of oil extraction is that in cold weather, when the oil congeals to a grease stage, it is necessary to heat the mass slightly in order to allow precipitation to take place. This is usually accomplished by steam coils being placed within the containing tank. Under this treatment the product soon liquefies, the foreign matter drops to the bottom, and the clear liquid is drained off through stopcocks placed just high enough to avoid the thick, muddy sediment at the bottom.

T'ung-yu is widely used throughout China as a paint oil for outside purposes. It is reported that as a drying oil it excels even linseed oil. One of its greatest local markets is found among the native boatmen, who never paint their boats, but coat them with the cruder grades of wood-oil, which not only gives the woodwork a bright, lustrous finish, but also acts as an excellent preservative. When certain mineral substances known as t'utzu and t'o-shen are added to the wood-oil and the resulting mass is heated for about two hours, a varnish called kuang-yu is produced, which is valuable as a waterproofing substance when placed on silks, pongees, and similar articles.

T'ung-yu is also used as an adulterant in the manufacture of lacquer varnish, as an illuminant, and as an ingredient in concrete, and when mixed with lime and bamboo shavings it is used by the natives in caulking their boats. The so-called Chinese or Indian ink is made from the soot resulting from the burning of the oil or the fruit husks. The product is also used as a dressing for leather, in the manufacture of soap, and as a varnish for fine furniture. It is chiefly used in foreign countries for the manufacture of varnish from cheap gums. Other oils require a higher and more expensive quality of gum in order that the resulting varnish be of equal grade. This feature, together with the rapidity with which wood-oil varnish dries, has caused the demand for the product steadily to increase.

The growing importance of wood-oil has led countries other than China to look into the possibilities for the culture of the tree within their own domains. The United States in particular has made rather extensive investigations along these lines, and it is reported that soil and climatic conditions in some of the Southern States are such as to permit of the tree's growth and cultivation. Certain it is that the product is of sufficient importance to warrant consumers in carefully investigating its future possibilities.

The quality of the 1916 output of wood-oil was below average. This condition was due in large measure to the fact that adulteration to a greater or less extent was practised by the native producers during the entire year. Especially was this so during the period of high market values. As a rule, tallow seed and peanut oils are the adulterants used, although sesame, rape, and poppy-seed oils are also utilized when their market values are not prohibitive.

The fruit of the t'ung-yu shu, from which wood-oil is made, usually matures about the middle of October, but last year rains prevented the gathering of the crop until nearly a month later.

Practically the entire output of wood-oil is produced in the provinces of Szechwan, Kweichow, Hunan, and Northern Hupeh, their percentages of output in the order named being 35, 25, 25, and 15. Hankow is the chief exporting centre, shipping, in 1915, 34,246 tons of oil, valued at 5,748,490 taels (about £730,000), or over 90 per cent. of the export for the whole of China. Wuchow is the only other exporting centre of any importance, but it in no way rivals Hankow, as its total shipment during 1915 was but 1,880 tons, valued at 315,767 taels (about £40,000).

China's output of wood-oil has decreased over 45 per cent. during the four years 1912-15, whereas the demand, especially in the United States, has been steadily growing. It is believed, by those most closely in touch with market conditions, that upon the resumption of normal conditions in China and in Europe the trade in this product will reach unprecedented levels.

THE American Red Cross Society has given a cheque for £250,000 to the British Red Cross Society to alleviate the suffering caused by the great battle in France.

Original Communications.

A CASE OF TRYPANOSOMIASIS WITH OTHER PROTOZOAL INFECTIONS CONTRACTED IN THE CAMEROONS, AND SOME OBSERVATIONS ON THE RELATIONSHIP OF *FILARIA DIURNA* WITH CALABAR SWELLINGS.

By Deputy Surgeon-General P. W. Bassett Smith, C.B., F.R.C.S., M.R.C.P., R.N.

In the *Journal of the Royal Naval Medical Service* [1] a full account of the first year's observations on this case was given. The man contracted the disease in the Cameroons during the latter half of 1915, and trypanosomes were first found in December of that year. He was under me in the Dreadnought Hospital from February, 1916, until November, 1916, where, with a combined treatment of galyl and antimony, he appeared to be recovering from the disease. The active parasite was morphologically identical with the *T. gambiense*, and this gave rise to the usual cyclical character of infection of the peripheral blood. The invasion at times was very high, 4,000 per c.mm., or one trypanosome to every two white cells. The clinical symptoms beyond the irregular attacks of fever were, however, slight. The early changes noted in the blood were very interesting, for, besides showing the occasional presence of trypanosomes, he also had a mixed malarial infection of subtertian and quartern parasites, the former disappearing first, but for over sixteen months quartern forms were occasionally seen in the blood. There was also a very high eosinophilia, which was probably associated with a filarial infection evidenced by the occasional outcrop of Calabar swellings, though this was not proved at the time.

On November 21, 1916, he at his own request was discharged from the hospital, and was taken on in the laboratory of the Medical School of the R.N. College so as to be constantly under my personal observation and treatment. He was treated with intra-muscular injections of atoxyl, gr. v, twice a week, and though he appeared well and strong the trypanosome infection recurred. In May, 1917, as the incidence of the trypanosomes was increasing and the condition was becoming more serious, he was given an intravenous injection (Martindale) of antimony oxide gr. $\frac{1}{2}$ and an intramuscular injection gr. $\frac{1}{4}$ three days later every week. The injections of tartarate of antimony have been used by Daniels, Low, and others with great benefit, and many cases have been reported, but as Van Saceghem and Nicolas [2] have shown that the tartarate is converted in the blood into the oxide this drug was employed, and it is nearly three times as strong as the tartarate, therefore a smaller quantity could be used. The oxide is, however, very much more difficult to keep in solution, requiring about 50 per cent. glycerine as its vehicle. It was thought that the sterilization of the blood from trypanosomes would be evanescent as the drug is rapidly eliminated by the kidneys, and that intermediate doses given intramuscularly, when the drug is more slowly absorbed and eliminated, would be more effective than when given intravenously alone; this I believe to be the case. At any rate, the results were most satisfactory. It is important to note that the addition of the glycerine to the blood-stream never caused any bad symptoms, and even when given intramuscularly it was attended with comparatively little discomfort. The treatment was commenced in May, 1917, and the man was able to carry on his duties in the laboratory. The trypanosomes immediately disappeared from his blood, and though up to September films were examined almost every day, 1,000 white cells being counted, the parasites were never again found, and there were no fresh pyrexial attacks. At the end of September the man left London and had no further treatment, but films of blood have been sent for examination every week. There was no recurrence of the trypanosomes and no relapse of the fever until the end of December, 1917. He had therefore been eight months free from any evidence of infection, and over two years had elapsed since the origin of the disease.

The case also brings out a very interesting fact bearing on the filarial origin of Calabar swellings. These were noted during the first year of the disease, and frequently an eosinophilia of 50 per cent. was present, but it was not until April, 7, 1917, that diurnal-sheathed filarial embryos were observed in the blood. At first these were very few, but they have remained constant ever since, two or three perhaps in each film. They appeared while the man was receiving full doses of antimony intravenously.

The results of animal experiments have been very instructive. Six white rats were repeatedly inoculated intraperitoneally with the blood of the patient at periods when the trypanosomes were plentifully present in the peripheral blood, but in none of these were trypanosomes ever recovered. Two of the rats died one month after their last inoculation and two lived for four months. In all these the spleen was much enlarged, but no definite trypanosomes could be found; sub-cultures from these were all negative. Two animals of the six were unaffected.

Three guinea-pigs were also inoculated.

No. 1 died after a month, but showed no splenic enlargement. No. 2 was inoculated three times in June, 1916. It first showed trypanosomes in October, but these only appeared at irregular intervals, and the animal died in April, 1917. A rat was successfully infected from it and twenty-two passages were made, but the strain was unfortunately lost. The virulence in the rats was increased, as the first rat lived thirty days and the last few eight to ten days. No. 3 guinea-pig was

inoculated in April, May, June and September, 1916, and trypanosomes were found in its blood in September, twenty-two days after the last injection, and they have been present in its blood ever since in very small numbers. At the present time, January, 1918, fifteen months after their first appearance, the animal appears quite well and shows about one trypanosome to 200 white cells. From this many white rats have been inoculated, but in only one have the parasites been found, and in this at irregular intervals; this animal appears to have recovered, as none have been found since September, and the rat is perfectly well. A rabbit has since been successfully infected intravenously from No. 3 guinea-pig.

Conclusions.

(1) It would thus appear that this Cameroons strain is but slightly toxic, very difficult to transmit, and not always pathogenic, but when successfully started in white rats it may by passage become as fatal as the ordinary *Gambiense* form.

(2) Intravenous inoculations of arsenic and antimony were not effective against malarial or filarial parasites, as these appeared in the peripheral blood during the treatment.

(3) The Calabar swellings are definitely associated with the *Filaria diurna*, the latter only appearing in the blood fourteen months after infection, but the whole time causing a high eosinophilia.

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[1] Bassett-Smith and Mangham. "Forms of Fever in West African Forces," *Journ. Roy. Naval Med. Service*, 1916, vol. ii, No. 4, p. 454.

[2] Van Saceghem (R.), and Nicoles (E.). "L'Émétique dans le traitement de trypanosomes," *Bull. Soc. Path. Exot.*, 1916, vol. ix, No. 10.

PLATE.

(1) Forms of trypanosomes in the peripheral blood (A B).
(2) Sheathed filarial embryo.
(3) Filaria and trypanosomes in same film.

I have to acknowledge here the great assistance given with the blood counts and photographs by Mr. S. Mangham, M.A.

[Since this article went to press the following important and interesting fact has been noted. In February, 1918, a mature *Filaria loa* was removed from beneath the skin of chest wall in the lower costal region. The worm was actually motile and moving in a circle, leaving a faint pink track. The patient at the time was still under treatment in the Dreadnought Hospital with intravenous injections of antimony, and *Filaria diurna* embryos were always to be found in the peripheral blood by day.]

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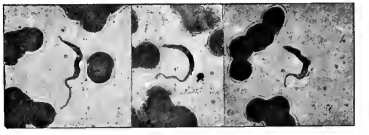
THE JOURNAL OF

Tropical Medicine and Hygiene

May 1, 1918.

THE FETISH OF MILK IN THE TREATMENT OF INTESTINAL AILMENTS.

Milk and beef-tea: Beef-tea and milk is the sum and substance of the usual diet in almost every illness due to any one of the specific fevers or to diseases of inflammatory origin. Some practitioners condemn the beef-tea as unsuitable in intestinal flux of any kind, and especially in typhoid



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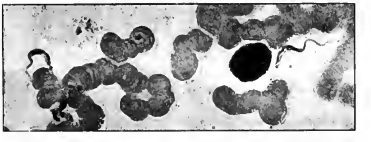

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FIG. 1.

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FIG. 2.

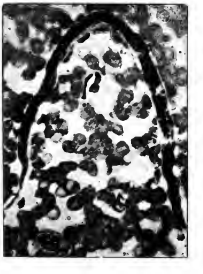

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FIG. 3.

To illustrate paper, "A Case of Trypanosomiasis with other Protozoal Infections contracted in the Cameroons, and some Observations on the Relationship of *Filaria diurna* with Calabar Swellings," by Deputy Surgeon-General P. W. BASSETT-SMITH, C.B., R.N., F.R.C.S., M.R.C.P.

do they eliminate the beef-tea and stick to the milk alone. A few weeks' diet of milk given two-hourly is the lot of the typhoid sufferer in Britain in the majority of cases. As a rule he is allowed nothing else. A drink is never suggested to allay thirst; and this strenuous régime of withholding all extras is considered as a sign of firmness of character on the doctor's part, and something to be placed to his credit by so doing. This Spartan-like severity is due to either thoughtlessness or to ignorance, which means culpable cruelty to the patient, and brings a slur upon the humanity and professional knowledge of the practitioner. He leaves the nurse with a diet chart, and the poor woman, brought up in the rigid régime of slavish adhesion to the doctor's orders, hears her patient's request for " a drink " with closed ears, and steels her heart against his prayer for something to stay his thirst. To offer a patient milk to allay his thirst is on a level with being offered a stone when he asks for bread, or a serpent when he asks for fish.

Yet the nurse is not told that she may give anything else but milk, and with machine-like rigidity she adheres to the diet chart, which says milk or milk and beef-tea only are to be given.

We are so engaged nowadays with blood counts, the presence of the bacillus or parasite and with laboratory findings, that we forget, or is it we despise all else in the treatment of the patient? The nurse—the real nurse, not the machine-made variety—will, of course, use that apt to be despised sense, common-sense, and allay her patient's thirst by home-made lemonade, toast water, rice tea, or even ordinary tea, made by pouring boiling water over tea leaves in a strainer held over (not in) a cup. A teapot is anathema in a sick room, and should never be seen there. These are not only harmless in all and every disease, but beneficial in every case, and the nurse who knows her business will change from one to the other, and quite frequently. Must the doctor be told of these drinks? Let the nurse judge for herself according to the temperament of the doctor; if he is a bigoted and self-complacent being he had better not be told, both from the humanitarian and also from the benefit of the patient's treatment points of view.

But the fetish of milk as *the* treatment is perhaps more apparent in the treatment of sprue and colitis than in any of the other diseases we know of. It is, as we unfortunately know, the fashion to put our sprue patients on milk and nothing else. It is well to call it a fashion, for as fashions built upon false, physiological and therapeutic bases come and go, so is the milk for sprue a mere fashion, which has nothing to justify its use scientifically nor practically.

Cow's milk is fraught with many possible contingencies between the time it is drawn from the cow until it reaches the consumer's table. In Britain the milk supplied to towns is " tampered with " in some fashion as a matter of necessity, if it is to be kept from going sour on its passage from the farm to the town house. This is accomplished by pasteurizing, by cooling, by the addition of formalin, salicylic acid, bicarbonate of soda, borax or boric acid, or by several other jugglings and manipulations. In the Tropics " something " has to be done even more assuredly than in temperate climates, as, owing to the heat, changes in the milk are more rapid and more certain to occur.

Which of all these is least deleterious? For that any of them are beneficial is a matter completely ruled out of any discussion on the subject. Whether will the formalin or the salicylic acid do least damage when employed as a preservative? We know that acute poisoning follows large doses of any one of these, but what about the chronic changes set up by small continued doses of the same (as in town-supplied milk) when they are added in small but sufficient quantities to prevent changes in the milk? Sprue is attended by an acid fermentation of the intestinal contents, and can be but increased if boric acid, the simplest, least harmful, and commonest of all milk preservatives, be added to the diet. Yet do we see patients in hospital and in private homes suffering from sprue treated by the decoction which passes by the name of milk. If the milk is to be used in the treatment of, say, sprue, the patient will have to go to the cow instead of bringing the cow's milk to the patient. Doctors who really still believe in the milk treatment of sprue—and there are many who have not got beyond that stage—should send their patients to a farm-house; the milk ought to be brought direct to the patient when possible from the cowshed or byre—that is, whilst the milk is still warm, if the full benefit is to be obtained. This is possible only thrice daily, as the cow cannot be milked every two hours to suit the patient's requirements. This, however, is as near perfection in the milk treatment of diseases as can be got, but it means the town doctor losing touch with his patient, which is inopportune and disadvantageous in several ways.

But even with milk direct from the cow will sprue be cured? The evidence is against it. The writer saw a case of a lady who had spent many years in India—born there, in fact—and when about 45 came to England, where with her husband she took up a small dairy farm in Sussex. Ten years after leaving India she developed typical sprue in January, and died in July of the same year, in spite of the fact that she had milk from her own cows brought to her direct from the milking at her very door. Cow's milk does not cure sprue, even when in a perfect state of freshness and purity; by persisting with its administration the ailment is prolonged, and cure rendered precarious to say the least of it. In sprue there is an acid fermentation in the intestinal tract; when milk is given this acidity serves to coagulate the casein of the milk and produces a curd which brings about a lessening of the diarrhœa. The stool in sprue when milk is taken is not a normal stool, it does not smell of fæces, it cuts like soft cheese, and is cheese in the making. It is never digested, but passed, and all the patient gets from the milk is

the whey left from the coagulating milk, and on this the patient starves, and the scorbutic condition at the basis of all sprue troubles persists. The improvement that occasionally follows milk taking in sprue is not cure. The apparent cure disappears the moment a change in diet towards normal is tried.

Without pushing this matter further in order to show that a meat diet effects a cure in as many weeks as milk takes months or years to accomplish, let us look at milk in other intestinal derangements.

Colitis, that great sequela of emetin-treated dysentery cases, is before us in superlative form at present. When dysentery was treated by ipecacuanha, colitis after dysentery was a rarity. Emetin is not ipecacuanha in composition, in its therapeutic effects, nor in its practical results. The one drug one disease—the dock and nettle system—never has been successful, and never will be. Quinine alone for malaria, emetin alone for dysentery, and so forth, is against thousands of years of experience, and ever will continue to be so. Emetin, until the blood in dysentery stools disappears—that is, until the death of the amœba—is satisfactory and a most valuable addition to our armamentarium. But the disappearance of blood does not mean the cure of the bowel complaint; that remains as a muco-colitis for months or for years, or with cessation and recurrences for a lifetime.

In colitis, milk—the ever handy resource of the ignorant—is persisted in with a tenacity worthy of a better cause. Ask the patient, Does diet affect your condition; does it increase the number of stools or their composition? The invariable answer is "No," as it is the answer of the observant physician. In colitis the seat of the trouble is the lower 2 in. of the sigmoid, as revealed and made patent to anyone who has used the sigmoidoscope; and unless the sigmoidoscope is used the practitioner remains in ignorance of what he is really treating. Being so, how can diet directly affect the ailment? It is some 26 ft. from the mouth to the rectum, and the food is dealt with long before the lower end of the intestine is reached, where excretion alone functions.

By persistence with milk the patient is kept in a weakly state; the liver in milk-fed adults shrinks to a condition of atony incompatible with the normal performance of its biliary and other secretions, and the patient's strength, weight, and vigour decline correspondingly. Put the colitis patient on to a full diet the strength benefits, the stools are not more frequent, and their consistence improves. Local treatment to the ulcers, such as touching the ulcerated spots with pure carbolic, enemata of sea water, &c., accompanied by a generous diet, cures in a few weeks where milk after many months has failed.

These examples could be multiplied, but without multiplying details one more will suffice.

The infantile diarrhœa, which carries off such an immense number of children below the age of 3 in Britain, may be cited as a disease in which adherence to the fetish of milk in gastro-intestinal treatment is fraught with danger. It is chiefly due to peristence in feeding the children suffering from vomiting and purging with milk that the mortality is so high. The stomach and intestines are in a state of acute catarrh; the milk given clots in the stomach at once, with the result that the irritable stomach rejects the clot, when it is either vomited or passed on into the inflamed intestine, whence it is speedily ejected with aches and colicky pains. Strength soon gives way, it being often merely a matter of a day or two for a fatal issue to occur. Various milks are tried: be it cows', asses', goats', mares', &c.; but all milks clot, and hence milk of any animal is inadmissible. Instead of milk give rice-water—the conjee water of the East, i.e., water in which rice has been boiled slowly for, say, two hours. The rice water does not coagulate and form clots in the stomach as does milk; it is soothing, readily absorbed, soon allays the vomiting, and the purging lessens almost at once.

It must be remembered that cow's milk is not used by well-nigh half the population of the earth. The Chinese do not use cow's milk except in the extreme north; it is seldom drunk in India, but converted into ghee. When an infant cannot get its natural food in China, it is either given over to a "wet nurse" or it is given rice conjee instead.

Milk at meals when animal food is eaten is against all Jewish teaching, and even milk puddings, in strict Jewish families in which the laws given in the Talmud are followed, are now allowable. The reason is that when meat is in the stomach and milk is taken the milk clots, and the clot encloses the particle of beef, mutton, chicken, &c., and the meat being in the centre of the mass, it is impossible for gastric juice to penetrate the clotted milk and thus reach the meat. Indigestion necessarily follows. The Talmud laws are in accordance with scientific finding. It is known that fish leaves the stomach in about two and a half hours, chicken in about three and a half hours, and meat in about four and a half hours. On turning to the Talmud, it will be found that milk is not allowable until two and a half hours after eating fish, three and a half hours after eating chicken, and four and a half hours after eating meat. How in early Jewish times these facts were known and milk withheld until the proper time it is impossible for us to fathom.

The above remarks may help to curb the "milk" fashion of feeding in disease, a "fashion" which, being unhygienic, requires to be expunged and considered experience allowed to come into play.

J. C.

Has any reader tried treating amœbic dysentery, acute or chronic, by Chaparro Amargora? The treatment was published in the *Journal of the American Medical Association* on May 10, 1914, and again in the same journal on March 25, 1916, by Dr. P. I. Nixon, of Texas.

Annotations.

Leprosy (A. G. Fages, *Semana Medica*, November 15).— The prophylaxis of leprosy requires careful disinfection of mouth and nose and of the cutaneous lesions to ward off contagion of others. These hygienic and prophylactic measures are never applied completely, so that each leper is a possible source of contagion. Eighty cases of leprosy are known in one district in Argentina. They are scattered in seven different regions; no attempt is made to isolate them, except in one town where ten are gathered under one roof. It is now planned to construct a large leprosarium with accommodation for 500 in the Chaco district. An inland leper colony of this kind is just adding fuel to the fire. The leper colony should be on some island apart from the centres of population. Each member of the colony should be given land and everything for successful farming. It should be a free farming community, except that the inmates cannot leave the island.

Influence of Diet on Toxicity of Sodium Tartrate (W. Salant and A. M. Swanson, *Journal of Pharmacology and Experimental Therapeutics*, February).—The mode of action of some diets and of fasting in modifying the toxicity of tartrate cannot be explained at present. The toxicity of sodium tartrate was most marked on a diet of oats, hay and cabbage. Diets rich in sugar were efficacious in decreasing toxicity, the effect being most pronounced on a diet of young carrots. A marked increase of resistance to tartrates was also observed on a diet of carrot leaves. Perhaps the favourable effects of some diets on the toxicity of tartrates might be due to several factors, among them inhibition of bacterial activity in the intestine, vitamines, or unknown constituents that might be present in some diets.

Tabes Dorsalis (Grossman, *Journal of Nervous and Mental Diseases*, February).—Of 240 cases of undoubted tabes the average age of syphilitic infection, dated from the primary chancre, was 24·4 years. The average age of onset of tabes was 39 years. No detectable difference existed in the age of onset of tabes in those patients treated with antisyphilitic remedies and in the age of onset in those untreated or presumably less treated. The probable average preataxic period is three years. The average life expectancy of the bedridden tabetic was 53 years. Among those tabetics who become bedridden, a short ataxic period usually follows a short preataxic period. The cause of death in tabes is syphilis. Syphilis and tabes lead to death through cardiovascular and renal degeneration, and through weakened resistance of non-syphilitic infections. The average age at which death occurs is 53 years. The mortality among tabetics over 53 years of age is 238 per thousand. Tabes is as non-lethal as any form of syphilis.

Abstract.

A SERIES OF SIXTEEN CASES OF BLACKWATER FEVER OCCURRING IN THE EASTERN MEDITERRANEAN.[1]

By J. A. Arkwright and E. H. Lepper.

The following notes are based on sixteen cases of blackwater fever which occurred during the months October, 1916, to April, 1917, inclusive. Two subsequent cases are also mentioned which showed special points of interest. All cases agreed clinically with the description of the disease. The series appears to be of special interest because—

(1) Though all had been suffering from malaria during the preceding months, only two had been in a malarious country before they were sent to Salonika in 1915 or 1916.

(2) Without exception all were cases of first attack, which occurred in Malta, where anopheles, if present, are very rare, and where malaria was not arising locally, and blackwater fever had not been previously known to originate.

(3) All but one were treated with quinine during the attack of blackwater fever.

When the first cases of blackwater fever occurred in Malta, the question was much discussed whether they were true cases of blackwater fever as it occurs in the Tropics, or of hæmoglobinuria due to an intense malarial infection.

There was no difference between the reported tropical cases and these occurring in Malta; and our cases were examples of the same disease as those recorded from tropical countries.

The interval between the entry into a malarious country and the first attack of blackwater fever varied from five to sixteen months.

The interval between the first recognized attack of malaria and the first attack of blackwater fever varied from 1·6 months to 8·5 months; in ten cases it was five months or more.

The time during which the men had been in Malta before the first attack varied from one to five months; in eight cases, three months or more.

In Asia and Africa it is stated by Daniels (1913) that few cases of blackwater fever occur within the first six months of residence, but that in Panama the proportion of attacks during the first three months is much larger.

P. falciparum was found in ten out of the thirteen cases diagnosed (76·9 per cent.).

P. vivax was found in three out of the thirteen cases diagnosed (23·1 per cent.).

It is usually stated that the kind of malaria with which recorded cases of blackwater fever have been infected is most commonly *P. falciparum*, and that the distribution of blackwater fever follows that of *P. falciparum* more nearly than of *P. vivax*. This point is by no means settled.

[1] Abstracted from the *Transactions of the Society of Tropical Medicine and Hygiene*, February, 1918.

During the attack of blackwater fever parasites were found in three cases, all *P. falciparum*.

At some time before the attack of blackwater fever parasites were found in nine additional cases; of these three were found within five days of the onset of blackwater fever.

After the attack of blackwater fever parasites were found in a relapse of malaria in one further case.

Nine cases had fever resembling malaria just before and leading up to the blackwater attack, and in six of them malarial parasites were found five or less days before the attack or during the attack. Most of the remainder of the sixteen cases had had definite malaria within a month, but the evidence of this is less definite.

Though in only three cases parasites were found during the attack, it must be remembered that almost all were receiving large doses of quinine.

Quinine before the attack of Blackwater Fever.—It was not found possible to determine exactly how long before the first appearance of hæmoglobinuria the last dose of quinine was taken, because the times at which the quinine was given were not always regular, and sometimes the first urine containing hæmoglobin may have been missed.

All cases had had at least 15 gr. daily during and following previous attacks of malaria. One patient, a fatal case, stated that he had taken no quinine for a week before the onset of blackwater fever, although he was disobeying orders by evading it.

In three the patient was stated to have taken a daily dose (probably 15 gr.) regularly for some weeks or months, and in one 30 gr. had been taken daily for a fortnight.

In one the daily dose of quinine was decreased from 30 to 15 gr. two days before the attack.

In three no satisfactory history could be obtained.

In the remaining seven cases the dose of quinine had been increased on account of a rise in temperature one, two, two, four, seven, four and one days before respectively.

The onset of hæmoglobinuria, as far as could be ascertained, was sudden, but as the patient had used the latrine in some cases, the time when dark urine was first passed was not always certain. The preliminary malaria made the occurrence of fever, shivering and rigors of uncertain value as marking the onset of the blackwater fever attack. In many cases, however, a severe rigor or vomiting, or both and often headache, followed in one to two hours by hæmoglobinuria, clearly indicated the onset of the fresh complication. Vomiting was an almost invariable symptom, and occurred in all except a mild relapsing case. In seven cases the vomiting was severe and persistent. One patient vomited persistently for five or six days, and during that time hardly any liquid appeared to be retained by the mouth or rectum. He nevertheless recovered.

Jaundice of some degree occurred in all the cases except one.

In eight cases it amounted to little more than the lemon yellow tint of skin and conjunctivæ seen in severe relapsing cases of malignant tertian without blackwater. In six there was a much more decided jaundice, such as is seen in mild cases of catarrhal jaundice.

In one of this series (and one of the later cases seen) the colour of skin during life and all the tissues post mortem were very deep yellow.

Bile pigment was not found in the urine (HNO_3 and iodine tests) in any of the sixteen cases; probably this was due to the difficulties introduced by the presence of hæmoglobin.

The blood serum, on the other hand, gave a marked reaction for bile pigment readily with HNO_3 and iodine in one case, even in dilution 1/20, and also in one of our later cases; both these patients were deeply jaundiced.

In two or three other cases slight reactions were obtained probably indicating bile pigment. It has been doubted whether the jaundice in blackwater fever is due to bile pigment, and perhaps it is rash to offer an opinion; but since the liver is undoubtedly disordered and swollen, and the bile intensely inspissated post mortem, it seems probable that the yellow colour of the skin is really due to bile pigment. At any rate, absence of the ordinary reactions for bile pigment in the urine does not exclude its presence in the circulating blood. Microscopic sections of the liver in one case appeared to show blocking of bile capillaries with inspissated bile and dilatation behind the obstruction.

Anæmia.—The degree of anæmia after twenty-four to forty-eight hours of illness was often extreme. It increased rapidly during the attack. The patient was blanched as after a severe hæmorrhage. The hæmoglobin fell to 24 per cent. in some cases, or even to about 16 per cent. in two cases. The recovery when the fever was at an end was usually steady.

Hæmoglobinuria.—The urine in all the cases (except in one, in which the colour was redder and less dark) was deep reddish brown, or *café noir*. On standing, a bulky pale deposit usually separated.

Spectrum.—With a spectroscope the bands of oxyhæmoglobin were seen after dilution, but in a test-tube of $\frac{1}{2}$ in. diameter it was often necessary to dilute with water six or eight times before these bands could be seen. A further band was usually seen in the red, but with the means at our disposal it was seldom possible to be certain whether this was due to methæmoglobin or acid hæmatin, for in acid urine oxyhæmoglobin is soon converted into acid hæmatin. There was probably usually, if not always, a mixture of pigments present.

Usually when the colour became less dark it rapidly improved, and yellow urine without blood pigment was passed in twelve to twenty-four hours.

The urine in one case, in whom suppression occurred early, was remarkable. No urine was passed after admission, but a history of urine "red like blood" on the previous day accompanied the patient to hospital. Thirty-six hours after admission 4 oz. was drawn off by a catheter; this was

dark greenish brown, but gave no bands in the spectrum; on boiling, it became almost solid with albumin. No bile pigment reaction could be obtained.

After addition of strong NaOH a purple red colour, due to hæmochromogen or reduced alkaline hæmatin, appeared, which gave the characteristic bands in the spectrum. This test proved the best to apply in cases where no characteristic spectrum was obtained, e.g., with brown urine containing albumin, such as occurred late in some cases when the colour was clearing up.

It is a useful test, for the additional reason that when acid hæmatin alone is present the characteristic bands are not seen if the solution is weak, but the hæmochromogen formed from such a solution gives very strongly marked bands.

In order to distinguish hæmoglobinuria from hæmaturia for certain, it is necessary to look for red blood corpuscles in a fresh specimen, since in hæmaturia the red blood corpuscles are often rapidly broken up in acid urine.

Urobilin was usually easily detected in considerable amount after boiling and filtering, especially after the first day or two of the attack.

The urine always contained a large amount of albumin, and a thick cloud on boiling was obtained after the urine had again become a normal colour. A thin cloud of albumin could usually be detected for some days to a week or more.

Microscopic examination of the deposit showed abundant yellow granules, usually very small, but often two microns or even four microns in diameter; these appeared to be formed of hæmoglobin or altered hæmoglobin.

Red blood corpuscles were usually absent, but a few were found late in one case on one occasion (a small number were also seen in several specimens from one of our subsequent cases, which ended fatally). In the deposit were also seen renal cells containing yellow granules, and casts sometimes hyaline, but chiefly full of yellow granules or of renal cells containing granules. The casts first appeared or increased in numbers after the first day or two, and sometimes were present in very large numbers. They were occasionally found for a week after the hæmoglobinuria had ceased. There was often a small reddish deposit after the colour of the urine had become normal, due to granules of hæmoglobin in cells or casts. If this deposit was dissolved in NaOH, a solution containing hæmochromogen was obtained.

The *quantity* of urine passed during the attack varied within wide limits. In cases which were doing well 50 to 60 oz. were usually passed in twenty-four hours, and about 40 oz. after the urine had resumed its normal colour. Partial or complete suppression of urine occurred in the three fatal cases.

The increased amount often secreted was probably in part due to the intravenous or rectal saline administered.

Intermission of Hæmoglobinuria.—Two of our sixteen cases showed complete intermission in the passing of dark urine, and in two other cases temporary diminution in the depth of colour occurred.

In Case 13 there appeared to be a correlation between the height of the fever and the darkness in the colour of the urine.

In Case 16, which was a second attack, there were two complete intermissions.

The *duration* of the hæmoglobinuria in different cases was from twelve hours to five and a half days, giving an average in fourteen cases (omitting the two cases with intermission) of 2·8 days. In two of the fatal cases the hæmoglobin had disappeared from the scanty urine before death, and in the period of depression the casts became very few.

Estimation of the Blood Pigment in Blackwater Fever Urine.—Direct estimation of the amount of blood pigment in the urine is very unsatisfactory, because a mixture of pigments is usually present, and some of it is in the form of granules. A modification of Sahli's method for estimating the hæmoglobin was found to be applicable. This consists essentially in first converting all the blood pigment present into acid hæmatin by adding HCl, and then comparing the colour with a standard solution of acid hæmatin. We found that all the blood pigments in solution could be turned into acid hæmatin in this way, and that the granular deposit of altered hæmoglobin was also taken up into solution by this means. Blood or methæmoglobin added to acid or alkaline urine, and allowed to stand at room temperature or at 37°, could be correctly estimated by this method.

The amount of hæmoglobin lost by the urine during the attack of blackwater fever was estimated in Case 14 to be equivalent to 1·95 oz. daily, or 11 oz. of normal blood during the whole attack. A loss of this order does not seem nearly sufficient to account for the high degree of anæmia produced by the disease. This was to be expected, since the liver, no doubt, deals with large amounts of the hæmoglobin set free by the destruction of red blood corpuscles, and transforms it into bile pigment; only the excess is excreted by the kidneys.

Fever.—The fever may be divided into three periods:—

(1) Before the definite onset of the blackwater fever attack; at this stage it appeared to be due to malaria.

(2) During the attack, when it was often as high as 104° or 105° F. and irregular.

(3) Post-hæmoglobinuric fever, which was very irregular, and was sometimes due to a complication, e.g., cystitis in Case 10.

During the post-hæmoglobinuric fever frequent and careful examinations of the blood-films failed to show the presence of parasites.

Relapses of malaria sometimes occurred during convalescence. Rises of temperature, suggesting malaria, occurred in six cases, but in most of them quinine was being taken, or had been given, before blood-films could be obtained and no parasites were found.

Fatal Cases.—Three of our sixteen cases ended

fatally, a mortality of 18·7 per cent. In two of these there was almost complete suppression of urine for some days. In the third partial suppression and incontinence of urine, with extreme anæmia (16 per cent. hæmoglobin) were responsible for the fatal issue. In Case 15 there was intense jaundice in addition. One of our cases subsequent to this series also had intense jaundice and died.

Post-mortem examination of the three fatal cases showed pigmentation of the spleen and liver, and a blackish discoloration of the apices of the pyramids of the kidney; also great inspissation of the bile, which, in the gall-bladder, was almost solid and of the consistency of very thick porridge.

Microscopically the kidneys showed blocking of the collecting tubules and dilatation of the capsules of Bowman and convoluted tubules behind the obstruction.

In the Case 15, in which there was a high degree of jaundice, the bile capillaries were blocked with inspissated bile, and dilatation of bile capillaries was also seen. No parasites were found in any of the three cases post mortem, but the spleen and liver contained much malarial pigment.

Hæmoglobinæmia.—The available evidence points to the hæmoglobinuria in blackwater fever being due to a preceding hæmoglobinæmia, i.e., to free hæmoglobin in the blood plasma in the general circulation. The blood serum was examined in ten of our cases, and in four of these was sufficiently coloured with blood pigment to give characteristic bands in the spectrum in a tube of 0·3 to 0·4 cm. in diameter. Of the six in which hæmoglobin could not be detected, in three the blood was taken only a few hours before the hæmoglobinuria ceased, and in one case during an intermission, and in one case after it had ceased. In the remaining case examined, which was a mild attack lasting twenty-eight hours, the serum was examined a few hours after the onset, but no hæmoglobin could be detected.

Citrated plasma was examined in three cases; in two cases hæmoglobin was present, and was absent in one case, the results being the same as in the case of the serum. In one case both serum and plasma were examined on the first and second days of the attack, and both were a deep brownish crimson colour on each occasion. The colour was due to methæmoglobin, probably with some oxyhæmoglobin and also to bile pigment. This patient was deeply jaundiced and died.

One of our subsequent cases, not included in the series of sixteen, was also deeply jaundiced; the blood serum in this case also was very deeply pigmented, and contained both hæmoglobin and bile pigment. In this latter case the serum was examined before the urine could be obtained, and the diagnosis of blackwater fever confirmed by this means.

Treatment.

Every case, except one, received one or more doses of quinine during the hæmoglobinuria. This was usually given in the form of the bihydrochloride, in doses of 10 to 15 gr. intramuscularly, but some patients received larger doses. When intravenous salines were given this route was used also for the quinine. Some of the cases received 15 gr. daily for a week; to others were given doses of 10 to 15 gr. at irregular intervals. Quinine hydrochloride or sulphate was often given by the mouth when the tendency to vomiting had ceased. In one or two cases the charts suggest that the quinine had some effect in reducing the fever. We could not detect any evidence that the quinine increased or caused a relapse of the hæmoglobinuria in our cases.

Saline injections were given every four or six hours by the rectum in almost all cases. In the more severe cases, especially when the enemata were not retained, one or more intravenous saline injections of one to two pints were given with decided benefit. Other treatment consisted of digitalin, pituitrin, strychnine, also calomel 2 gr. in several cases. Ten c.c. of normal horse serum was given subcutaneously to one man the day before the hæmoglobinuria ceased.

We did not initiate and do not wish to defend the early quinine treatment adopted. Treatment, in our opinion, should consist of saline injections with digitalin or pituitrin in the early stages, and, after the first seven to ten days, quinine regularly in doses of 10 gr. daily, to prevent relapse of malaria, unless there is special evidence of susceptibility to this drug. If parasites were present we should advise quinine intramuscularly, even during the attack.

Causation of Blackwater Fever.

The following points are established:—

(1) Malaria has always preceded the attack for some time, measured usually by months or years.

(2) Active infection with malaria is present at the time of onset.

(3) Quinine has usually, but not always, been taken shortly before the attack, as a rule on account of the malaria which ushers in the attack.

The share claimed for quinine as a cause of blackwater fever must be limited by the following conditions:—

(*a*) Quinine has only the effect of precipitating an attack in certain persons.

(*b*) In these persons it only acts in this way at certain times which cannot be foreseen, since quinine may be taken by the same person regularly or irregularly for weeks or months without inducing blackwater fever. During or after an attack of blackwater fever, quinine frequently has no harmful effect.

(*c*) A few individuals appear to have acquired so high a degree of predisposition that hæmoglobinuria occurs almost on every occasion on which quinine is taken. Even in these cases the records almost always show that the quinine has been taken on account of a relapse of fever.

Since an attack of malaria is the immediate pre-

cursor of an attack of blackwater fever, and quinine when taken has been taken on account of this malaria, it seems unnecessary to invoke the assistance of quinine in the great majority of cases. In any case one has to assume some hæmolytic factor which suddenly acquires prominence, and quinine does not seem to fill the part.

The two suggestions made are: (1) That a hæmolysin is developed as an immunity reaction to the constituents of the red blood corpuscles set free in repeated malarial attacks. (2) That a lysin is formed as an antibody to the malarial parasites, and the hæmolysin is secondary to a sudden destruction of parasites. In either case quinine might act as an adjunct to these hypothetical lysins by its own feeble hæmolytic activity and by killing the parasites.

Summary and Conclusions.

(1) Blackwater fever is due to malaria.

(2) It is predisposed to by a prolonged malarial infection.

(3) The attack of blackwater fever is precipitated by a relapse or recurrence of malaria.

(4) Before the onset of blackwater fever the patients had (*a*) arrived in a malarious country on an average eleven and one-third months; maximum, sixteen months; minimum, seven months; (*b*) had the first recognized attack of malaria on an average five months; maximum, eight and a half months; minimum, fifty days; (*c*) arrived in a country previously free from both malaria and blackwater fever on an average eighty-seven days; maximum, five months; minimum, one month.

(5) Quinine in the class of cases with which we have met has had no share in producing blackwater fever; nor has quinine treatment during or after the attack had any effect in prolonging or reproducing the hæmoglobinuria.

(6) The jaundice of blackwater fever is certainly in some cases due to bile pigment in the circulation.

(7) It is possible to estimate the total blood pigment passed in the urine of blackwater fever cases by a modification of Sahli's method. The amount of hæmoglobin passed in the urine is only a small part of that set free in the body.

(8) The treatment which appeared to be of most value was intravenous or rectal administration of physiological salt solution.

Whether quinine during the attack of blackwater fever was of any value or not it was difficult to decide.

We are very much indebted to the Medical Officers of St. Andrew's and St. David's Hospitals, Malta, for the clinical notes of the above cases and for their courtesy and help. Our thanks are especially due to Major W. Campbell, Captains Allen and Fannin, and Lieutenant Barrett, R.A.M.C.; and to Drs. Bell, Gilchrist, Gorrie, Hollway and Rougvie, attached R.A.M.C.

HYDATID PYOPNEUMOCYST OF THE LIVER.[1]

By M. H, Vegas.
Buenos Aires.

(*Continued from p.* 89.)

The history of this, my fourth case, is as follows:—

Case IV.—V. A., boy, Argentine, aged 11, from Province of Salta. Hydatid cyst of liver and lung were diagnosed. The patient entered the hospital September 28, 1915. Birth was normal; at three days of age he had ophthalmia, which was cured in a month. He took the breast until three months old, and was then given sterilized milk. At this period he had diarrhœa for eight days. When three years of age he had measles with an intense cough. He had good health until a year ago, when he was seized with shivering fits, high fever, sweats, and dry cough. Quinine was prescribed. This may have been malaria, which is endemic in the Province of Salta, where he lives. These fever attacks recurred monthly until five months ago, when they ceased. About four weeks ago he again suffered with this dry cough, with which there were now occasional expectorations slightly tinged with blood. One day while playing he coughed up a membrane like cooked white of egg. Ten days ago he had another attack of coughing, with abundant expectorations in which were membranes, pus, and some blood; all this continued on his entry in hospital. When in the ward a second vomit was observed in which he threw up before our eyes a great quantity of pus, membranes, and blood. Upon examination a deformation of the thorax was observed, confined to the base of the right half and clearly defined in front. Only râles were heard on auscultation of the right side and upper part of the lung at the back. Palpation in front only revealed a rhoncus; there was continual cough. A tumour the size of an orange with respiratory mobility was observed in the epigastrium and right hypochondrium, which region it had deformed. Liver dullness increased; the lower border descended to four fingers' breadth below the costal margin on the mammillary line, being half-way between the xiphoid appendix and the umbilicus on the median line; the tumour was elastic and uninterruptedly continuous with the liver. Under X-rays a rounded tumour was seen in the vertex of the left lung and another at the base of the right lung.

October 5. Patient was going on well; cough and expectoration diminished; no physical signs in the lungs. October 21. There was no cough nor expectoration. A radiograph showed a round shadow on the left side and a diffused shade on the right; a clearly defined cyst was seen in the upper lobe of the left lung. The less clearly marked shadow in the right lung probably corresponded to a rup-

[1] Abstracted from *New York Medical Journal*, February 23, 1918.

tured cyst. November 13. There was hæmoptysis; no fever nor physical signs; he was kept in bed and calcium chloride given. February 4, 1916. Fever and cough had recurred; the cyst of the liver had increased in size and was more prominent. A blood examination was thought advisable, but the parents refused consent. April 4. Swelling was still more prominent; the X-rays revealed the same conditions as before.

May 5. Under local anæsthesia a right pararectal incision beginning at the costal margin and extending 8 cm. down was made. The exterior rectus sheath was incised and the muscle pulled inward, and the posterior layer of the rectus sheath and the parietal peritoneum were cut through and the peritoneal cavity opened. The cyst was reached and punctured and 500 grm. of clear, fertile liquid without daughter cysts were drawn off. The cyst was dried, a little liquid, slightly bile-tinged, flowing out, and closed without drainage; the wall was sutured. Post-operative: Everything perfectly normal. May 12. Region operated upon was somewhat swollen. On examination percussion gave sonority in the prominent part of the tumour and dullness in the other part; these notes varied with the changes of the patient's position. Under the X-rays liquid was seen in the lower part topped by a horizontal line above which was a clear zone pushing the diaphragm upward. The patient was taken to the theatre, where a puncture was made, and with Potain's apparatus 300 grm. of dirty, mahogany-coloured liquid was drawn off. May 15. The region was again swollen; X-rays revealed the same conditions as before. Two stitches were removed from the wound, and a fresh puncture gave exit to a dirty, bad smelling, mahogany-coloured liquid, thicker than previously. A few drops of chloroform were administered, and a bistoury was inserted in the puncture and the cavity incised; an abundant discharge of thick, bad smelling, mahogany-coloured liquid, containing pieces of membrane, followed. A drainage tube was inserted. May 17. Bile discharge was so great that the sheets of the bed were soaked through; a drainage tube was left in place. May 18. Bile discharge was less; tricalcine was given twice a day. June 6. The effusion and bad smell persisted in spite of intracystic lavages with formol, oxygenated water, and Dakin's liquid. A draught of quinine, kola, and gentian was given. June 11. The drainage tube was removed and a gauze pad inserted. When this was removed on the following day 50 grm. of bad-smelling pus were discharged. Antiseptic lavage with formol was done; a glass drainage tube was inserted. There was no fever nor cough; general condition was good. July 3. The glass drainage tube was left in place; necrotic tissues were discharged; quantity of pus had lessened. General condition was good. July 25. The drainage tube was removed. July 30. Patient discharged, cured.

In these four histories this complication is presented in patients affected with hydatid cyst of the liver treated by the Australian method, who, after a fortnight, a month, or even longer return with the belly again swollen. Sometimes there is slight pain but no fever; at other times there are dyspnœa, fever, and grave general symptoms. These symptoms correspond roughly to the two forms described as hydropneumocysts and pyopneumocysts. The first has been aptly summed up as intrahepatic, hydro-aeric effusion, clinically not septic. In the second form we run the entire scale, from the clear, bacterially aseptic effusion to the true purulent, septic, or putrid liquid. In both forms percussion gives tympanic sonority in the zone of the swelling surrounded by the hepatic dullness in dorsal decumbency. The intercostal spaces are more or less dilated according to the importance of the pyopneumonic effusion. The tympanic zone varies with changes of the patient's position, but it is always sharply limited below by a line that remains horizontal. In my second case there was slight jaundice, marked cyanosis, and dyspnœa which increased when the patient's position was changed. There was also hippocratic succussion distinctly audible to those standing around; auscultation revealed amphoric metallic sounds.

Radioscopic examination shows a subdiaphragmatic, intrahepatic clear zone which moves with changes of the patient's position, and below it a dark zone topped by a horizontal line, which also moves in accordance with the patient's position. When you shake the patient in front of the screen you can see little waves that make distinct, dark splashes against the walls of the cavity above; they are strikingly prominent in the clear zone. I saw this most distinctly in my second and third cases. The heart is displaced to the left to an extent which depends upon the importance of the pyopneumonic effusion. To these symptoms is added the *pouls endohépatique*, which consists of the little undulations of the liquid, seen when the patient is told to hold his breath, and which are due to the contractions of the heart, the movements being transmitted through the liquid.

The functional symptoms of the first form are not very important; heaviness, tension, dull pain in the hepatic region, slight dyspnœa, digestive disturbances, and sometimes slight fever. The functional symptoms of the second form are a hepatic, peritoneal, or pleural reaction. These symptoms consist of local pain, marked digestive disturbances, slight jaundice, nausea, cough, dyspnœa, &c. There are also the general phenomena of fever, sweats, paleness, emaciation, &c. The incision of the cavity gives exit to pus and more or less fetid gases. I noted all these symptoms in my first and second cases. The liquid, as well as the gases, aspirated by puncture is variable in appearance and quality. It may be odourless, dark mahogany-coloured, and containing grumes, such as I observed in my third case; it may be completely purulent, with fetid gases, as in my first case; or, again, it may have that characteristic smell of sulphuretted hydrogen which it possessed in my second case. On rare

occasions the liquid is blood-stained and dark brown in colour, or of a reddish colour containing an important proportion of blood. A cyst treated by marsupialization also presents the curious phenomenon of intracystic pneumoptosis, but its clinical interest is naturally less. This complication is generally present in all cysts having calcified or rigid walls.

Now let us consider how the infection of the cystic sac is produced. Some writers believe that the infection is produced by the atmospheric air which enters the cyst by respiration—intracystic respiration—especially in those cases of a cyst of the convex face of the liver adhering to the diaphragm, as in my first case. I am of opinion that this belief is exaggerated, since experiments prove that the air is reabsorbed within a certain time, giving up its oxygen and taking up nitrogen and carbonic acid, which are expelled from the sac. Furthermore, I have operated upon many cysts of the liver, and only on four occasions have I seen the curious phenomenon of cystic pyopneumoptosis, and it is perfectly logical to suppose that in every case the atmospheric air had entered the sac by respiration. It was thought formerly that the bile was antiseptic and microbicidal, but research has proved that even in its normal state the bile contains both aerobic and anaerobic germs, and therefore a bile discharge may easily be the cause of intracystic infection. The infection arises chiefly from an anaerobic fermentation produced by an infection of the walls of the cyst.

There are various producing agents of these infections, the *Colon bacillus*, *Bacillus fragilis*, and *Staphylococcus parvulus*. Three strictly anaerobic microbes have been found. *Bacillus nebulosus*, *Streptococcus tenuis*, and *Staphylococcus parvulus*. The bacteriological examination of the mahogany-coloured liquid aspirated in my third case gave aerobic bacilli, the staphylococcus and *Bacillus coli*, and anaerobic, *Bacillus coli communis* and the streptococcus. The liquid is important and can be a source of danger and complications for the patient, as by a slight infection or by a septicæmic or angiocolitic *poussée* this serosity can be infected, since the reabsorption of the oxygen of the gaseous medium and its replacement by carbonic oxide put it in condition of anaerobic life. It is in consideration of the fact that the liquid of the pneumocyst is more or less septic that I have chosen the name of pyopneumocyst, which seems to me to be preferable to that of *hydropneumocyste*, later modified to *hydropneumokyste*.

The diagnosis of these post-operative pyopneumocysts is usually easy; you have only to remember the symptoms which I have described, and on no account to forget that to know if a cyst treated by the Australian method is cured or not, you must have recourse to the X-rays, a method which gives, practically, mathematical security. The prognosis of these pyopneumo effusions, if left to themselves, is generally unfavourable except in those lucky cases when the pus or septic liquid, making its way through the abdominal wall, reaches the exterior by a sinus which, as a rule, heals rapidly. Usually the patient falls into a rapid decline, he becomes cachectic, and is exposed to the danger of rupture of the sac with its attendant serious consequences. Generally the liquid contents of the cyst are only slightly septic, but there are cases of suppuration, or of septic bile discharges accompanied by septic gases, in which a good prognosis is doubtful. A woman, aged 29, died from this cause. I believe, therefore, that the prognosis will improve when we diagnose this complication more promptly, and consequently give the adequate treatment at an earlier stage. I feel sure that my first case resulted in death because, not knowing this complication at that time, I operated at a very late stage.

So the surgeon has not a waiting part to play; on the contrary, he must draw off the liquid at the earliest possible moment. He has the choice of two methods: puncture with aspiration and incision with drainage. The first may be usually used, if the general condition of the patient permits. My third case was only once punctured. Naturally, in cases of frankly purulent effusions accompanied by fever, sweats, and bad general condition, we must not think of puncture, but consider it as if it were a case of abscess, incising without delay and employing ample drainage, with lavages of oxygenated water and Dakin's liquid to fight the anaerobic infection. As a rule this sinus heals rapidly, but it may remain open for a considerable time, as in my second case, in which the drainage continued for three months. You must remember that it is not necessary to evacuate the cavity down to the last bubble of gas. The little hydrogaseous residuum will sooner or later be reabsorbed, and you may prove this by regular radioscopic examinations.

Since the source of infection is attributed to the bile, attempts have been made to practise in all cases to be operated for hydatid cysts of the liver, a pre-operative and post-operative biliary antisepsis, consisting of the administration some time previous to operation of salicylate of sodium, ox bile, &c., but this is inefficient. Delbet has proposed to aspirate the air before closing the sac, but this is dangerous on account of the hæmorrhage or bile discharge that may be produced *ex vacuo*.

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Saccharin is largely coming into use in England, especially since the dread of it being a cause of cancer has been removed publicly. It is a fact that persons with chronic stomach ailment very frequently take to saccharin in the belief that sugar is bad for them. As many of these stomach troubles become malignant later, the saccharin has been pronounced to be the cause of the disease turning to cancer.

Reviews.

ANTI-MALARIAL WORK IN MACEDONIA. By Drs. Willoughby and Cassidy. Pp. x + 68, Cr. 8vo. 14 original plates. H. K. Lewis and Co., Ltd., 136, Gower Street, W.C.1. 1918. 3s. 6d. net.

This work is of considerable interest, being the practical experience of a home expert and a medical officer of health for Eastbourne. It shows considerable originality as well as a judicious use of the previous experience of others. There are many useful suggestions for those with tropical experience, as well as those whose experience is greater in general sanitation than in anti-malarial work. The authors fully deal with the prevalence of malaria, recurrent attacks, and anti-malarial measures, the habits of mosquitoes, and the various methods of destroying them, their eggs, larvæ and pupæ by all known methods; prevention by drainage, removal of weeds, &c., protection of individuals and dwellings. The comments on malaria prophylaxis are well considered and as conclusive as the subject allows. The print is of a large size, on light non-glossy paper; well selected illustrations show up well.

THE INFLUENCE OF SUNLIGHT IN THE PRODUCTION OF CANCER OF THE SKIN. By C. Norman Paul, M.B., Ch.M. Pp. 57. 43 illustrations. Cr. 4to. H. K. Lewis and Co., Ltd. 136, Gower Street, W.C.1. Price 10s. 6d. net.

This work may be looked upon as the last word on the subject, which for many years has engaged the attention of tropical practitioners and all others interested in skin diseases and cancer. The illustrations in black and white cannot be improved upon. As to their treatment, that remains somewhat unsettled, but one thing is certain, that they require vigorous treatment and brook no delay. The author and publisher are to be congratulated on producing an excellent work on a subject of interest to all, but about which previous writers are loath to express definite conclusions.

TUMOURS: THEIR NATURE AND CAUSATION. By W. D'Este Emery, M.D., B.Sc.Lond. Pp. xx + 146. Cr. 8vo. H. K. Lewis and Co., Ltd., 136, Gower Street, W.C.1. Price 5s. net.

The object of this work is to show that it is possible, in fact highly probable, that tumours are of parasitic origin, that the objections which have been raised against the parasitic theory are untenable and unimportant. We have seldom read a book with so much pleasure, because, although there is much which a reader considers opposed to his own opinions, the author has dealt so delicately and courteously with the opinions of others that the book is distinctly interesting, and may be looked upon as an example of courteous controversy.

Personal Notes.

COLONIAL MEDICAL SERVICE.

West African Medical Staff.

Transfers and Promotions.—A. E. Horn, M.D., B.Sc.Lond., M.R.C.S.Eng., L.R.C.P.Lond., Senior Medical Officer, Nigeria (Northern Provinces), to be Provincial Medical Officer. R. O. White, L.R.C.S., L.R.C.P.Ireland, Medical Officer, to be Senior Medical Officer, Gold Coast. H. R. Ellis, M.B.Durham, M.R.C.S.Eng., L.R.C.P.Lond., Medical Officer, Nigeria (Southern Provinces), to be Senior Medical Officer.

Deaths. A. S. T. Swann, M.B., C.M.Glas., D.P.H.Edin. and Glas., Medical Officer, Nigeria (Northern Provinces), lost in the sinking of the ss. *Apapa* by enemy action. H. L. Burgess, M.R.C.S.Eng., L.R.C.P.Lond., Medical Officer, Nigeria (Northern Provinces), lost at sea in the ss. *Umgeni*. J. E. L. Johnston, M.B., B.S.Lond., M.R.C.S.Eng., L.R.C.P. Lond., D.T.M. and H.Cantab., Medical Officer, Nigerian (Northern Provinces), lost at sea in the ss. *Umgeni*. K. Manson, M.B., B.S.Durham, Medical Officer, Gold Coast, lost at sea in the ss. *Umgeni*.

Transfers.—J. S. Pearson, M.R.C.S.Eng., L.R.C.P.Lond., Medical Officer, transferred from Gold Coast to Sierra Leone. E. F. Ward, M.D., B.Ch., B.A.O.Belfast, Medical Officer, transferred from Sierra Leone to Gambia. R. F. Williams, M.B., B.C.Cantab., D.P.H.Ireland, Medical Officer, transferred from Nigeria (Northern Provinces), to Gold Coast.

Retirements.—R. G. Ball, M.B., B.Ch., B.A.O.Dublin, Medical Officer, Gold Coast, retired with a gratuity. E. Brabazon, M.R.C.S.Eng., L.R.C.P.Lond., D.T.M.Liverpool, Medical Officer, Gold Coast, retired on pension. D. Burrows, L.R.C.S., L.R.C.P.Edin., L.F.P.S.Glas., Provincial Medical Officer, Sierra Leone, retired on pension. C. T. Costello, B.A.Dublin, M.D., B.Ch., B.A.O.Dublin, Medical Officer, Nigeria (Northern Provinces), retired on pension. G. de P. D'Amico, M.R.C.S.Eng., L.R.C.P.Lond., M.D.Louvain, Medical Officer, Gold Coast, retired on pension. R. Mugliston, M.R.C.S.Eng., L.R.C.P.Lond., Medical Officer, Gold Coast, retired on pension. A. W. S. Smythe, L.R.C.S., L.R.C.P. Edin., L.F.P.S.Glas., Medical Officer, Nigeria (Southern Provinces), retired on pension.

Return to Staff.—F. C. V. Thompson, L.M.S.S.A.Lond., has returned to the Staff from temporary employment as Lieutenant in the Royal Army Medical Corps.

Temporary appointment.—J. R. C. Stephens, M.R.C.S.Eng., L.R.C.P.Lond., to be Temporary Medical Officer, Nigeria.

The following officer has been given a temporary commission in the Royal Army Medical Corps: J. S. Pearson, Sierra Leone.

The following have returned to the Staff from temporary employment in the Royal Army Medical Corps: B. J. Courtney (Nigeria), C. L. Ivers (Gold Coast), R. F. Williams, M.C. (Gold Coast).

The following are employed on military duties in East Africa: P. W. Black, B. T. Courtney, W. J. Martyn-Clark, G. Wilson (Nigeria), J. M. O'Brien, W. A. Ryan, W. M. Wade, R. F. Williams, M.C. (Gold Coast), E. H. Mayhew (Sierra Leone).

The following officer has been temporarily lent for service under the Provisional Civil Administration, German East Africa: C. L. Ivers (Gold Coast).

COFFEE IN BRITISH GUIANA.—According to the *Journal of the Board of Agriculture*, British Guiana, the coffee industry of the colony continues to increase. In 1905 the area under cultivation was 1,432 acres; in 1910, 2,546 acres; and in 1915, 4,468 acres. The Liberian variety is chiefly planted, as it gives good returns, and costs less to cultivate than the Arabian variety. Most of the coffee produced in the colony is consumed locally, only a small proportion being exported.

Original Communications.

SUDANESE EXAMPLES OF TWO COMMON HYPERKERATOSES.

(1) Ichthyosis.

By Albert J. Chalmers, M.D., F.R.C.S., D.P.H.
Director, Wellcome Tropical Research Laboratories.
AND
Captain Arthur Innes, R.A.M.C. (T.)
Attached the Egyptian Army, Khartoum.

Introductory.—The present paper is the fourth short note, published in this Journal, dealing with the subject of the *Hyperkeratoses* which we have met with in the Sudan. The first note dealt with *Acanthokeratodermia præcornufacions*, the second considered *Keratodermia punctata*, while the third contained a reference to a couple of points concerning *Keratodermia punctata* which had been omitted in the original paper.

In the present paper we very briefly consider the first of two well-known cosmopolitan affections, viz., ichthyosis and pityriasis rubra pilaris, and our excuses in bringing forward remarks upon such well-known diseases are that illustrations of the diseases as seen in the black skin are very few, while the anatomical features are open to discussion.

A Sudanese Ichthyosis.—The first known reference to a disease resembling ichthyosis emanates from the Tropics, and is to be found in the fourth book of Avicenna's "Canons," Division VII, Tractatus II, Capitulum IX, where the diseases Morphea, Alguada, and Albarras alba and nigra are described. The last-named is said to form scales resembling those of fish, a description well borne out by fig. 5 of the present paper, and it seems to us that Avicenna really meant ichthyosis by this description rather than elephantiasis as Willan thought probable.

(Avicenna's description is as follows: "Est scabiositas accidens cuti aspera vehemens et facit squamas sicuti sunt piscium.")

Apart from the writings of Avicenna, the disease seems to have been confused with lichen and lepra, but in 1652 Panaroli mentioned that he had seen a beautiful woman whose skin was covered with scales resembling those of a fish or a serpent. After this Stalpart Van der Wiel and others mentioned the disease, but in 1731 Machin first described, in the Royal Society of London, the case of Edward Lambert, the 14-year-old son of a healthy country labourer in Suffolk, whose wife and other children were in excellent health. This boy's skin was compared to the bark of a tree, to the skin of a seal, to the hide of an elephant, or to that on the legs of a rhinoceros, while other people thought that the appearance was due to a series of warts uniting and spreading over the body. The condition appeared some seven to eight weeks after birth, and he was said to have been born with a perfectly normal skin, and he was further stated to shed the horny layer of his skin about the autumn of each year.

In 1755 this boy, now a man of 40 years of age, was again mentioned in the Royal Society by Henry Baker, and is the case referred to by Lorry in 1777 as follows:—

"... raro et apud Anglos celebri, exemplo, hystricis Africanæ forman ut in illo viro quem sub nomine *porcupineman* diaria Anglica descripserunt."

This case appears to be one of Ichthyosis hystrix; it must be clearly understood that by this term is meant an ichthyosis and not a nævus, as many authors have classified cases of Linear nævus under the name Ichthyosis hystrix.

His six children were said to have been born with normal skins and to have acquired ichthyosis in about nine weeks after birth. When seen by Baker all these children had died except one boy. This boy became the father of the celebrated John and Richard Lambert, who made a tour of certain parts of the Continent under the name of the "Porcupine men," as they suffered from ichthyosis just like their father and grandfather.

Accounts of their cutaneous condition were written by Tilesius in 1802, by Alibert in 1805, and by Buniva in 1809.

In this way the nature of the disease became well known, and Willan in 1808 defined the term ichthyosis as a permanently harsh, dry, scaly, and almost horny texture of the integuments of the body unconnected with internal disorder. The disease ichthyosis has been subdivided into varieties, but it is doubtful if these are worthy of being considered as definite entities, except perhaps Ichthyosis hystrix.

The Tropics seem to have been regarded as almost the home of ichthyosis, and this idea appears to have been started by missionaries from Paraguay communicating with Buffon, who, in the third volume of his "Natural History," says that there is an extraordinary malady in this region which is a kind of leprosy, in which the whole body is covered with crusts like the scales of a fish.

Hirsch gives a number of references to its occurrence in the East Indian and Pacific Islands, but without denying its presence in those islands one is probably justified in considering that some, at least, of these accounts confused *Tinea imbricata* with ichthyosis.

Clavel about 1865 stated that it was common in the Marquesas among people who chew *Piper methysticum* to make kawa, but we can find no support for this idea.

It has been recorded in Ceylon by Castellani, but, as far as we know, the following is the first case to be described in a native of the Sudan:—

Clinical Description.—The patient is a Sudanese man, aged about 45, and a native of the Red Sea Province. He believes that at birth his skin was

normal, but that in a short time it became reddish in the areas now affected by ichthyosis, and that as he grew older these areas became darker and darker, until in a couple of years they reached the present condition, *vide* Plate I.

With regard to his family history, his father and mother were cousins, but were not affected as he is. He says that he had six brothers, four of whom are dead and two are alive. Of the dead he states that three were affected in the same way as himself.

He had three sisters, of whom only one had a skin disease like himself, and she is dead. He has lived all his life on the Red Sea coast.

There is no itching and no desquamation—that is to say, he does not shed the diseased skin in the manner described by the Lamberts. He suffers from no symptoms whatever connected with his skin eruption, and he really is a well-developed, strong healthy man, as can be judged by an examination of figs. 1 and 4 on Plate I, but he is not married and has no children.

With regard to his condition at the time of examination, his hairy scalp is in a state of dry seborrhœa.

On the face there are ichthyotic spots (fig. 2) below the outer canthus of the eyelids on each side. These areas are very dark and show no scales.

The ears (fig. 6) show scaly patches on the helix, the antihelix, and the lobules, while behind the right ear there is a small sebaceous cyst. The general distribution of the eruption on the limbs and body is exhibited by figs. 1, 2 and 4.

The neck is free from ichthyotic thickening, but shows patches of *Tinea alba*.

The right arm exhibits ichthyotic areas on the shoulder, and on the extensor surface of the arm (fig. 4), but the main area is on the extensor surface of the forearm (fig. 7), and on the dorsum of the hand almost to the nails (fig. 9). From the extensor surface the eruption spreads to the flexor surface of the forearm in the region of the wrist, reaching the mid line in the lower third of the forearm (fig. 1).

There is slight keratosic thickening of the flexor aspects of the palm and fingers (fig. 10).

The left hand and arm are in much the same condition, and in general there is some attempt at bilateral symmetry in the distribution of the eruption (figs. 1 and 4). The nails of the right hand are in good condition, but the left thumb (fig. 3) shows a slight degree of *Acanthokeratodermia præcornufacicus*, a term which includes Hyperkeratosis subungualis.

There is no sign of any eruption on the front of the chest, and the penis is also free therefrom, but on the anterior aspect of the abdomen there are two little spots situate below and on each side of the umbilicus (fig. 1).

As regards the back, there is a slight tendency to ichthyosis about the angles of the scapulæ, and there are isolated spots (figs. 1, 13 and 14) along either side of the spine, and two of these resemble warts. Each lumbar region shows an ichthyotic spot (fig. 4), that on the left being the larger.

There is a well-defined ichthyotic patch on each buttock (fig. 4).

The flexor aspects of the thighs and legs are very markedly affected (fig. 4), while the external aspects from the crests of the ilium downwards are extensively attacked (fig. 7), and the extensor surface of the right thigh (figs. 1 and 7) is more diseased than the left. Over the knee creases are very evident (fig. 1), while the extensor aspect of both legs and the dorsa of the feet clearly show the eruption (fig. 1).

If an individual patch such as that shown in fig. 12 is examined, it will be seen to have sharply defined edges and to be divided by transverse furrows. It will further be observed that the area is distinctly raised above the level of the surrounding skin, which is normal in texture and colour, and that it varies in colour from dark grey to black, but where scales occur whitish lines or areas are to be seen.

When an ichthyotic patch encloses an area of skin this is usually quite normal (fig. 11).

Old scars are very evident in the ichthyotic areas (fig. 11).

Sometimes, as in fig. 5, the ichthyotic area is divided not merely by transverse but also by longitudinal clefts, which cut it into small areas which produce the appearance of the so-called fish scales.

There were no ulcers or painful fissures to be found in our patient, whose general health was excellent, and all his organs in good condition. Sensation was normal to touch, and to heat and cold.

Pathological Anatomy.—Figs. 17 and 18 of Plate IV are continuous and join one on to the other, the right-hand margin of fig. 17 and the left-hand margin of fig. 18 being continuous. They represent the greater part of the ichthyotic area of a small patch which was excised and cut into sections which began and ended in apparently healthy tissue. The beginning and ending in the less hyperkeratosic skin is not represented in the figures, as too much space would have been occupied, but a small area is depicted in fig. 16B, when it will be seen to be not quite normal.

If now these figures (17 and 18) are carefully examined with a lens, it will be noted that there is a very marked hyperkeratosis, and that, although there has been some acanthosis, as is evidenced by the cellular downgrowths into the cutis and by the elongated twisted and subdivided forms of the papillæ, still there is no marked general thickening of the rete Malpighii, and it will be quite evident that there is no trace of either the stratum lucidum or of stratum granulosum. The thinness of the rete over the apices of the papillæ should be especially noted, also the cone-like condensation of the wavy layers of the stratum corneum in the areas corresponding to the original papillæ. Further, fig. 17 shows that there is no marked cellular infiltration into either the papillæ, the subpapillary layer or the corium generally. Fig. 19 depicts the opening of a hair follicle, and shows how the hyper-

PLATE I.

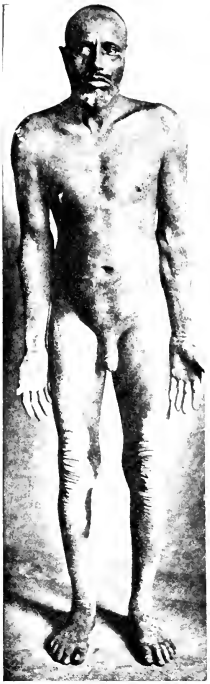

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

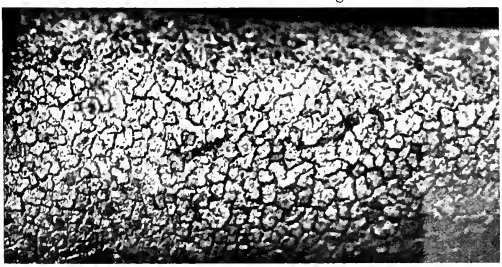

Fig. 5.

Fig. 6.

To illustrate paper, "Sudanese Examples of Two Common Hyperkeratoses.—I. Ichthyosis." by Albert J. Chalmers, M.D., F.R.C.S., D.P.H., and Captain Arthur Innes, R.A.M.C. (T.).

PLATE II.

Fig. 7.

Fig. 9.

Fig. 8.

Fig. 10.

To illustrate paper, "Sudanese Examples of Two Common Hyperkeratoses.—I. Ichthyosis," by ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H., and Captain ARTHUR INNES, R.A.M.C. (T.).

PLATE III.

Fig. 11.

Fig. 12.

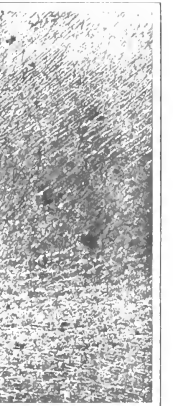

Fig. 13.

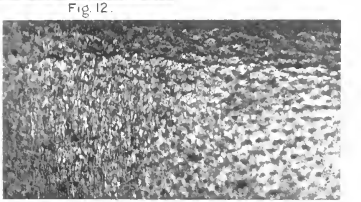

Fig. 14.

Fig. 15.

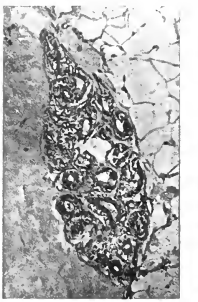

Fig. 16 A.

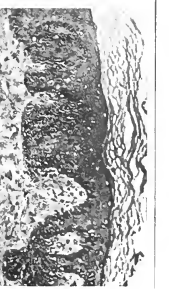

Fig. 16 B.

To illustrate paper, "Sudanese Examples of Two Common Hyperkeratoses.—I. Ichthyosis," by Albert J. Chalmers, M.D., F.R.C.S., D.P.H., and Captain Arthur Innes, R.A.M.C. (T.).

PLATE IV.

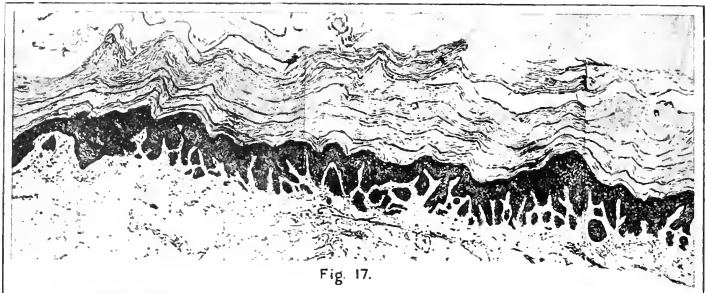

Fig. 17.

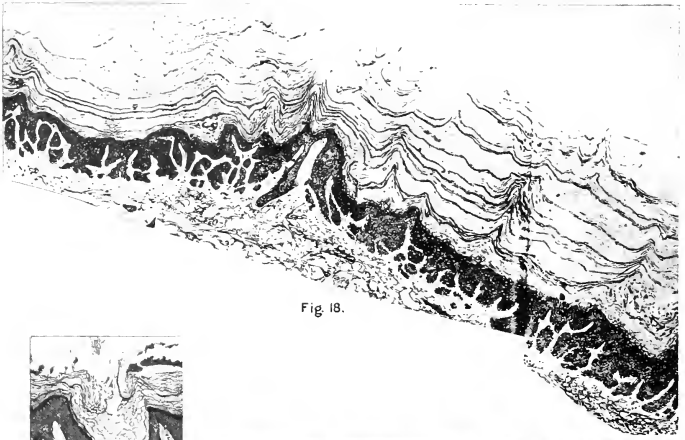

Fig. 18.

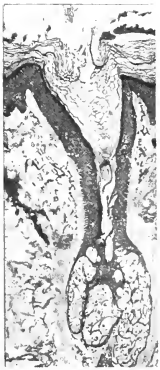

Fig. 19.

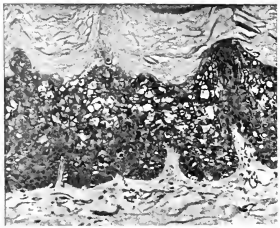

Fig. 20.

Fig. 21.

To illustrate paper, "Sudanese Examples of Two Common Hyperkeratoses.—I. Ichthyosis," by Albert J. Chalmers, M.D., F.R.C.S., D.P.H., and Captain Arthur Innes, R.A.M.C. (T.).

keratosis invades the neck of the follicle without, however, damaging the sebaceous glands or in this case the hair. Fig. 15 shows another hair caught in this hyperkeratosic growth and being prevented from emerging and becoming a proper hair has looped upon itself, as is seen by its shaft being cut three times in the section, while it continues to be embedded in the horny cells.

The openings and ducts of the sweat glands appear to be normal, but the coil (fig. 16A) deserves more consideration.

The corium (fig. 16A and fig. 20) in general shows marked swelling of the collagenous fibres with corresponding diminution of the lymph spaces, thus giving rise to a denser appearance than normal, but there is no sign of inflammation, and the slight cellular increase seen at places around the vessels (fig. 20) is open to other interpretations.

After this brief review of the general aspect of the disease, as shown in our sections, we may now proceed to investigate the appearances shown from within outwards in more detail.

Commencing in the deepest part of the sections, one notes that there is a normal or almost normal quantity of subcutaneous fatty tissue, also apparently normal in character (fig. 16A). Closely related to these fatty masses (fig. 16A) lie the sweat glands, the coils of which are surrounded by fibrous connective tissue, in which lie more connective tissue cells than are normal.

The acinus is lined as a rule by only a single layer of cells, but these are vacuolated and degenerated, and are surrounded by what appears to be a basement membrane swollen out by collagen or altered collagen, in which, or applied to which, lie the non-striped muscular fibres. The lumen of the acinus is patent as a rule, but may be blocked with inspissated material.

The sweat ducts do not appear to be abnormal, but there is a distinct increase in the connective tissue cells around the ducts in the corium.

The corium itself consists of bundles of connective tissue of which the fibres are swollen by an unusual amount of collagenous substance. Here and there may be seen groups of normal fibres with their attendant connective tissue cells. The lymph spaces are not very evident, being probably somewhat obstructed by the swollen collagenous fibres.

The portions of the hair follicle, with arrector pili muscle and sebaceous glands situate in the corium, appear to be normal, but it is otherwise with the shaft of the hair in the epithelium, as will be pointed out later.

As one approaches the epithelium the vessels are noted to be surrounded by an evident, but slight, cellular increase which is composed of single nucleated connective tissue cells. No polymorphonuclear leucocytes or plasma cells could be seen, nor was any sign of endarteritis observed, nor was the lumen noted to be reduced in size, while many of the vessels contained red corpuscles.

The papillæ are usually long and narrow, but may be broad, and do not show any appreciable increase in their cellular elements.

The stratum germinativum appears as a rule to be normal, but it is quite otherwise with the rete, for nowhere in the section, not even at the margin where the stratum granulosum is present, can one see the striæ and the intercellular spaces of a normal rete Malpighii; on the other hand, the cells are closely driven together, and their nuclei are vacuolated and degenerate.

At the margins of the section, where there is little sign of ichthyosis, the stratum granulosum is present (fig. 16B), but no stratum lucidum can be observed, and, even in these sections, the rete Malpighii is far from normal. In the ichthyotic area, however, there is no sign of stratum granulosum or stratum lucidum.

There is, however, one point of considerable interest to be observed in these sections. It is an area of vacuolar degeneration of the cells of the rete which does not affect the stratum germinativum (fig. 20). It would appear as though these cells were about to disappear and their place to be taken by the horny cells; if this really does occur, it would lead to a marked thinning of the rete (*vide* Unna's Ichthyosis nitida).

The passage from the compressed and apparently fused cells of the rete with their degenerate nuclei to the deepest strata of the horny layer is abrupt. The cytoplasm of the rete appears to be converted into horny material and the nuclei to disappear, leaving small cavities.

These deepest horny cells show no nuclei and are closely wedged together and form, as indicated above, the cones and wedges, the former corresponding to the papillæ, and the latter to the interpapillary areas.

The more peripherally situate horny layers are much looser in texture.

The shaft of a hair may perforate the horny cells which are seen in fig. 19 to be filling up the mouth of the follicle, or the hair may be caught in these cells and bent in such a way that it does not emerge from the mouth of the follicle, but lies embedded in the cells filling that mouth (fig. 15). We have failed to observe the hair cysts mentioned by Unna, but it will be noted that the patient showed a small cyst behind the ear which appeared to us to be a "sebaceous cyst."

When this description is compared with Unna's writings, it will be observed that it agrees with his Ichthyosis serpentina in that it shows acanthosis by the long, twisted and divided papillæ.

It differs therefrom, and agrees with his ichthyosis nitida in the following:—

(1) The thinning of the rete over the papillæ.

(2) The obliteration of the spaces between the cells of the rete.

(3) The absence of the stratum granulosum.

(4) The changes in the sweat glands.

It would appear as though there was no essential difference, and that in his nitida specimens the peculiar degeneration of the rete cells mentioned above had played their part and thinned this layer, while in his serpentina this had not taken place while in ours it was only beginning.

Further, it would appear that the Vienna School, with its added eczema, i.e., more or less of an added dermatitis, was more correct in its description than Unna.

We have been unable to refer to the writings of Esoff, Audry, Tommasoli and Giovannini, who have also examined the anatomy.

Etiology.—Ichthyosis is not, strictly speaking, congenital—that is to say, the child is never born with ichthyotic patches, but these areas appear a variable time after birth. It would therefore seem that the error, whatever it is, started in intra-uterine life, and that this must be some profound modification in the body is evident by the fact that, once established, it can be transmitted by the male germinal elements for several generations, and there does appear to be some reason for suggesting that perhaps it follows the hereditary tendencies called "*Mendel's Law.*"

The modification mentioned above is evidently not due to any parasitic organism, as there is no evidence of the disease being transmitted from man to man, or from man to animals, and research has failed so far to demonstrate any such cause: moreover, the victims are in apparently excellent health, capable of performing hard work, intelligent, and sometimes long-lived, though it would appear as though they were specially liable to fatal illnesses in early life, but it is very difficult, without re-examining this subject under modern conditions, to affirm that the ichthyosis had anything to do with this mortality.

It would therefore appear as though the cause must be physical or chemical, or a combination of the two.

The changes in the sweat glands, the cellular accumulation around the vessels of the corium, and the collagenous swelling of the connective tissue fibres all point to a chemical substance of an abnormal nature arriving in the cutaneous system from some area or organ of the body other than the skin.

The extraordinary degeneration depicted in fig. 20, as well as the degeneration of the cells of the sweat acinus shown in fig. 16A, so closely resemble the changes seen in the epidermis of an early case of acnitis (*vide* References) that it suggests the possibility of similar chemical causation, viz., *an anaphylactic change*.

It is not possible for us to test this theory on our patient, as we have only slowly come to this hypothesis, and the last time we saw our man was more than one year ago.

But there is evidence that ichthyosis can disappear, and also that it can be cured if treated sufficiently early; e.g., Unna writes:—

"Profuse sweating improves ichthyosis, it sometimes heals during acute fever, and it also heals *if appropriately* treated sufficiently early."

This appears to us to be of importance, because readers who consult the reference given with regard to a case of acnitis, appropriately treated, on the basis of the theory of a chemical cause, and in the early stages of the complaint, will find how readily it reacted to this treatment and has so far not returned, as far as we know, after some eighteen months interval, whereas it is well known that acnitis in its chronic condition is difficult to cure.

We would therefore suggest as a working hypothesis for further research that ichthyosis is an anaphylactic change slowly produced in certain cutaneous cells which have been sensitized in intra-uterine life.

In the harlequin fœtus the whole process is completed *in utero*, but in the majority of cases of ichthyosis the chemical substance only acts slowly in post-uterine life, and, indeed, there is evidence of irritation of the skin at the onset of the disease, because all records speak of the flush to be seen in the skin before the thickening commences.

This theory of chemical action is supported by the brief histories of acquired cases given by Crocker when the disease appeared:—

(*a*) In the first case quoted after a period of *poor living*.

(*b*) In the second case after *scarlet fever*.

(*c*) In the third case there was *habitual looseness of the bowels*.

(*d*) In the last quoted case the disease appeared while *suckling*.

We are fully aware that the above is a pure hypothesis, and that it is merely based upon anatomical observation and clinical history, but it may be useful in that it may arouse interest in the search for appropriate treatment in the early stages of an otherwise apparently incurable and distressing disease, and so many so-called untreatable diseases exist at the present day, though they do show marked signs of reduction in the Tropics.

Pathology.—It is obvious that a substance derived from some error in metabolism is excreted by the sweat ducts and the skin to which it is brought by the blood-vessels, because there does not appear to be any other reason for the perivascular cellular accumulation, the periacinar cellular accumulation, and the degeneration of the cells of the sweat acinus, with the consequent dryness of the skin.

Passing from the vessels it causes the collagenous swelling of the connective tissue fibres of the corium, and causes the epithelial changes in cells sensitized *in utero* or some time after birth.

It does not appear to attack the hair follicles, hence probably the reason why the scalp always escapes.

Further, it appears to us that if the anaphylactic action is energetic the result is the condition described by Unna as *Ichthyosis nitida*, whereas, if it is not so destructive, but merely stimulative, Unna's *Ichthyosis serpentina* is produced, while our case unites these two varieties, being *Ichthyosis serpentina* clinically, and in the general appearance of the papillæ as seen in histological sections, and *Ichthyosis nitida* in most other anatomical points, and from this we conclude that these two varieties are the same.

Classification.—Having thus explained our views

as to the possible ætiology and pathology of the disease, it now behoves us to consider its position in a scheme of classification of the hyperkeratoses to which class of skin diseases it belongs.

The hyperkeratoses can be defined as any cutaneous condition in which the cells of the horny layer have a greater coherence than normal, and they may be divided into *the secondary hyperkeratoses*, which occur in the course of some other disease, and *the primary hyperkeratoses*, which are essentially and primarily cutaneous diseases in which the coherence and piling up of the horny scales are very prominent characters. It is sufficiently obvious that Ichthyosis belongs to this last-named division.

The primary hyperkeratoses may be subdivided into *the generalized* and *the localized*, and it is obvious that ichthyosis belongs to the generalized.

The generalized primary hyperkeratoses may be further classified into those of *embryonic origin*, those of *unknown origin, but showing hereditary tendencies*, and those which are *acquired*.

With regard to ichthyosis, it is certainly not embryonic in origin, because infants destined to become ichthyotic are born with normal skins, and the disease develops usually some little time after birth, as in the present case, and does not attain its full development till nearly two years have elapsed.

The only other member of this group, as far as we know, is Neuburger's *Acrokeratoma hereditarium*, in which the skin of the whole body is yellowish brown, rough and dry, not perspiring except during great heat, and then only in the axillæ, but the hyperkeratosis is most marked on the extensor aspects of the extremities, and especially so on the hands and feet. On the extensor surfaces the hyperkeratosis resembles shagreen leather. The passage from the rough to the healthy skin is very gradual. The hairs are short and bristly. The cases show evidence of bad circulation in that the hands and feet are always cold. On the backs of the hands and dorsa of the feet the skin can only with difficulty be pinched up. The disease was traced by Neuburger through three generations.

Anatomically it is characterized by a special development of the stratum granulosum, which varied from three to eight rows of cells and by omitting to attack the hair follicles, but many anatomical characters were like ichthyosis.

Anatomically, according to Behring, there is no difference between the harlequin fœtus and ichthyosis, but ætiologically there appears the essential difference that one is purely embryonic in origin and the other post-embryonic.

Ichthyosis is divided by many authors into varieties extending from simple Xerodermia through I. simplex vel scutellata, I. nitida vel nacrée, and I. serpentina vel saurodermia vel nigricans to Ichthyosis hystrix. Unfortunately, this latter term is used by some authors for an advanced form of ichthyosis, and by others for a linear nævus.

Having now defined its position in the skin diseases, we must consider its diagnostic characters.

Diagnosis.—The essential characters of ichthyosis are:—

(1) The presence of greyish, greenish, or blackish thickenings of a hard, horny character forming scales, shields and diffuse and irregular thickenings (figs. 1, 4, 5, 7 and 11).

(2) The almost universal distribution of these thickenings (figs. 1 and 4).

(3) The symmetrical arrangement (figs. 1 and 4).

(4) The preference for extensor surfaces as compared with flexor surfaces (compare fig. 4 with fig. 1).

(5) The marked development on the extensor surfaces of the elbows and knees (figs. 1 and 4).

(6) The marked absence from the folds of joints, e.g., the axilla, flexor aspects of elbows and knees (figs. 1 and 4).

(7) Absence from scalp.

(8) Rarity on neck and face.

(9) Folding formed by the eruption in certain places (fig. 9).

(10) Dryness of the eruption.

(11) Slightness of the scaling (fig. 6 is the most marked).

(12) History of the commencement some time after birth and the development during the first two years of life.

The differential diagnosis has to be made from the various kinds of hyperkeratosis, and this has practically been given in the section upon classification which it is useless to repeat. The history of case will enable it to be differentiated from the chronic dermatitis of pellagra.

Treatment.—We gave the patient thyroid extract internally with no effect. He refused the drastic external French treatment recommended by Gougerot, which we proposed to carry out.

In the light, however, of our present knowledge as to the histopathology and possible causation, we should adopt an entirely different course if we ever came across a young child similarly affected, as we should, without doubt, attempt first the treatment found to be so efficacious in acnitis.

Summary.—In the present paper we have raised the question as to whether or no ichthyosis is ætiologically an *Anaphylactic phenemenon* in which the sensitization of the cutaneous cells probably arises *in utero* and is capable of being transmitted through the male (and probably through the female also) to the offspring, while the actual exciting cause is possibly some chemical substance produced in post-uterine life.

We have further endeavoured to show that there is really only one variety of the disease, and that our present case links together the two most commonly accepted varieties, viz., the nitida and the serpentina, though Ichthyosis hystrix used in the most modern sense of the word may be worthy of being considered a separate variety.

We have further shown the position of the disease in the classification of the hyperkeratoses suggested

by Chalmers and Atiyah in the paper upon "*Acanthokeratodermia praecornufaciens.*"

Acknowledgments.—We acknowledge gratefully the kindness with which Dr. Crossland, Marine Biologist, spared the services of our patient for some time, and that of Dr. Christopherson, who took him into the General Hospital, Khartoum, during our investigation.

Khartoum,
February 16, 1918.

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ILLUSTRATIONS.

(*These photographs may be examined advantageously by means of a reading lens.*)

PLATE I.

FIG. 1.—Front view of the patients to show the distribution of the eruption. Photograph.

FIG. 2.—Dark Ichthyotic patch just below external canthus of the left eye. Photograph.

FIG. 3.—Acanthokeratodermia Praecornufaciens (Hyperkeratosis Subungualis of Hebra) affecting the thumb. Photograph.

FIG. 4.—Back view of the patient to show distribution of the eruption. Photograph.

FIG. 5.—Outer aspect of the leg to show the scale-like appearance. Photograph.

FIG. 6.—The left ear to show scaly ichthyotic areas. Photograph.

PLATE II.

FIG. 7.—Side view of the thigh and extensor aspect of the forearm. Photograph.

FIG. 8.—Sole of the foot. Photograph.

FIG. 9.—Dorsal view of the hand. Photograph.

FIG. 10.—Palm of the hand. Photograph.

PLATE III.

FIG. 11.—Ichthyotic areas on the dorsal aspect of the right arm showing islands of healthy skin and the scar of an old wound. Photograph.

FIG 12.—A typical ichthyotic patch from the thigh showing transverse fissures. Photograph.

FIG. 13.—Isolated raised patches on the back. Photograph.

FIG. 14.—Isolated flat patches on the back. Photograph.

FIG. 15.—A hair bent and twisted in among the cells of the Stratum corneum from which it failed to escape. × 70 diameters. Photomicrograph.

FIG. 16A.—Sweat gland, adipose tissure, and corium. × 100 diameters. Photomicrograph.

FIG. 16B.—Margin of the area depicted in 17 and 18 to shew the presence of the Stratum granulosum and the compressed condition of the cells of the rete. × 100 diameters. Photomicrograph.

PLATE IV.

FIGS. 17-18.—These figures depict in series nearly the whole of a section cut through a small ichthyotic area removed from the outer aspect of the left arm near the shoulder. The section runs from apparently healthy tissue almost into apparently healthy tissues, and the figures illustrate nearly all the diseased area. There is a slight curve on the section which made it difficult to show the photographs in any other way than in that represented. × originally 60 diameters, and reduced by subsequent photography to 45 diameters. Photomicrograph.

FIG. 19.—Mouth of hair follicle to show hyperkeratosis. 60 diameters. Photomicrograph.

FIG 20. Degenerated area of rete. × 100 diameters. Photomicrograph.

FIG. 21.—Corium, rete and horny layer showing clearly the bases of the cones in the horny layer. × 70 diameters. Photomicrograph.

THIS WEEK'S DRUG MARKET.

THE upward tendency of prices continues, and supplies of many commonly prescribed drugs are steadily dwindling. Bromides are difficult to obtain in quantity, and a further rise in quotations would seem almost inevitable. Borax and boric acid are both dearer. Methyl salicylate is almost unobtainable, tartaric acid and cream of tartar are very scarce, and prices continue to tend upwards. An inspection of the stocks of quinine in the London warehouses reveals the fact that the quantity is much larger than had been estimated; this is fortunate, but prices are hardly likely to decline, since even the larger stocks are small compared with normal times. Salicylates are unchanged in price, but aspirin has an easier tendency, and the output from the British factories appears to be increasing. Phenacetin is also in better supply. Antifebrin and hexamine are again rather dearer. Olive oil, almond oil, and medicinal castor oil are very scarce. It seems probable that there will be a further advance in the price of camphor, owing to the difficulty of obtaining supplies. Cloves are dearer, and clove oil is scarcer with an upward price tendency. Aloin and terpineol are both rather dearer. Chaulmoogra oil and oil of amber (oleum succini) are quoted higher. The scarcity of milk sugar is unrelieved. Isinglass has been sold at lower rates. —*The Hospital*, April 13, 1918.

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THE JOURNAL OF

Tropical Medicine and Hygiene

MAY 15, 1918.

WAR-TIME DOCTORS AND THE PUBLIC.

THE medical profession at present is confronted with a situation which does not tend to improve either its efficiency or its dignity.

Men are being brought up for general service in the Army, and submitted to the medical department for examination as to their fitness, whilst at the same time the understanding has crept in that "they must not be too particular," as the men must be obtained somehow. It is a trying position, and made all the more so owing to the enormous numbers of men to be examined and the paucity of medical examiners. In civil hospital practice we are quite familiar with the rapid handling one sees in out-patient departments of large hospitals, where as many as two or three hundred patients have to be "seen" in an afternoon. But there is a difference. In civil hospitals the majority of the out-patients are old cases, the new cases being but a fraction of those attending. In examinations for military services all are practically new cases, and these cases have, or ought to be, gone into. The method of dealing with out-patients is that the new cases are, for the most part, seen first, and each has to be carefully examined, a diagnosis made, and notes of the cases taken and duly chronicled.

The twenty or thirty new cases take a considerable time, two or three hours perhaps; the old cases are often seen at the rate of two a minute, for it is only a question of "Repeat" being written on the patient's card. Now and again old cases requiring re-examination owing to some untoward symptoms have arisen, but they are comparatively few. In examinations for the Army all are practically new cases, and all require, therefore, careful investigation and consideration if an accurate diagnosis is to be made. That an accurate diagnosis is necessary is imperative, both in the interests of the candidate and of the nation. To pass a man who has an unsatisfactory *history* even is apt to provide the State with a burden, which is bad economy, to say the least of it. But to pass a man whose *physical condition* has not been sufficiently tested is certain to fill a hospital bed at an early date. There may be an excuse when the history is either not gone into or even neglected, but to pass a physically unsound man from want of care in diagnosis is unpardonable. Mistakes may be made, of course—that is inevitable; but when it is openly stated "I have no time to bother about the urine" it is a disgraceful and a dishonest act.

Yet how many men with the history of, say, recurring albuminuria actually present are pushed through owing to neglect to examine the urine; this is reaching a degree which is tending to promote a scandal. The answer "that there is a war on" does not relieve the medical profession of the slight being put upon it. Doctors are in the position of sanitary advisers to the State, and it is their duty to protect the State and the officers in command of the armies in the field from being overburdened with unsound men. The last thing a commanding officer desires is a man of unsound physique, and he looks to the medical officer to see that such men do not come into his command. As usual it is quality, not quantity, that tells in an army as well as in most other things, and an unsound man will help to increase the numbers in the field, but weakens the striking power of the unit to which he belongs.

Ignorance is pardonable, but not carelessness in

examination. We are not all endowed alike as diagnosticians, but we need not be wilfully careless —for that there is no apology acceptable.

Yet another element comes into play when examining recruits. The man's manner may irritate the medical officers to such a degree that one is provoked to recommend a man as fit in retaliation for his "protesting too much," and for his evident attempt to try to get out of serving. The doctor ought to be blind and deaf to everything except the man's physical state; a mere machine in fact in the matter, with neither sentiment nor tenderheartedness—a man unbiased and unprovokable, of even temper and sound judgment, a perfect being in fact in temper and skill. Such men are few, and rarely found, however, for to err is human. Only those who have been through the experience of examining recruits know the ordeal the *doctor* has to go through. The Polish Jew before him whines and complains of symptoms which are accompanied by no apparent physical signs; a man without country, and therefore no national spirit, is a provoking creature and perhaps wholly despicable, yet his complaint may be real, his history of rheumatic fever genuine, and his harrowing story of unfitness for work owing to gastric, intestinal, or rheumatic ailments quite true. In private practice his statements would be believed and treated, in public examination for service they are apt to be flouted and to be received with deaf ears, for it would seem apparent he is only trying to escape service with the Army. Lately another group of men have to be dealt with. Men between 40 and 50 have to be examined and graded; men in stable positions in life, who have proved their capacity in business, and by whom the nation's commerce is being managed and conducted; successful men, who have worked hard and upon whom some detriment to their health and physique, due to their excessive devotion to their trade or profession in younger years, has left its mark. It may merely be that they are gouty, those to whom Harrogate or Bath or other spas are not unknown. What is the flaw that sent these men to a watering-place, for none go there for choice. It is a matter of "history" rather than "present state"; but the investigation takes time—more time than is possible at a public examination, and so the man is passed according to the "whim" of the moment, for there is nothing to go upon as far as the physical state shows. Few men, very few successful business men reach the late forties without some illness or state which points to a diathesis of some kind which, were it carefully inquired into, indicates an incapacity for field service. These are the men the doctor has frequently before him at present, and the perplexity of fitness or unfitness is difficult to decide. The pressure from authority serves in most instances to lead to the neglect of the diathesis, and to launch the 40 to 50 men on a military career, fraught with the danger of aggravating disease latent for the moment, but ready to become acute from the exigencies of working in new and untoward conditions. It is difficult to blame the medical examiner in such cases, but were he examining the same man in private life, there is no doubt what would be his opinion as to fitness of such a "case" for extraneous service.

That is the crux of the question between the civil practitioner and the one enlisted for temporary service by the State. The latter forgets his prewar relationship to the public, and he now views the man before him from the official standpoint, and the two are for the most part incongruous.

From this position it is difficult to escape; but were we to advise upon the point, we would recommend the doctor examiner to check the belief that every man that comes before him is a shirker at heart unless he proves himself otherwise; and to give ear to the possibility of some men being honest in their statements, and that the medical certificate he brings from "his own" doctor is worthy of being at least read, and perhaps accredited to even a small degree. It is rudeness that the public complain of on the part of the doctor examiner more than anything else; rudeness to the person being examined, rudely slighting his fellow-practitioner who dares to send a written statement of the history and physical state of his patient. There is no need for such an attitude; it only leads to the profession being tradneed; the swearing, so frequently reported as part of the examining doctor's programme, brings disgrace to the whole profession. It is said that it will take twenty years to wipe out the slur that is at present cast on the medical profession at home owing to their behaviour at the recruiting boards. And for what? Not for their opinion as to the "case," but owing to the way the examination was conducted, and most of all for the accompanying remarks which are often not in accordance with the status of what a doctor ought to be socially, nor expected from the lips of a man belonging to a learned profession.

* * *

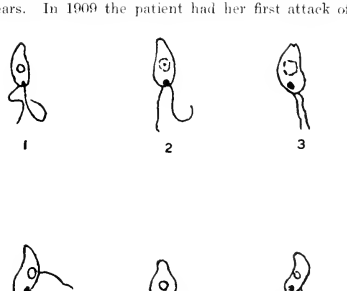
Pituitary Extract in Treatment of Paralysis of the Intestines (E. Kirmisson, *Bulletin de l'Académie de Médecine*, January 29).—Pituitary extract cures the paralysis of the intestine which so often follows operations for appendicitis. A typical case was a girl of over 10 who had no movements of the bowels for six days after removal of a gangrenous appendix. The abdomen was enormously distended, and neither lavage of the stomach, enemas or castor oil suppositories had any effect on the symptoms of acute peritonitis. Then a subcutaneous injection of pituitary extract induced a small passage, and repeating the injection on two successive days dissipated the alarming symptoms. A French preparation of the posterior lobe of the pituitary body was used. The constancy and the regularity of the results in his experience with this treatment are as interesting from the physiologic as from the clinical standpoint.

Original Communications.

A CASE OF BLACKWATER FEVER WITH PROWAZEKIA IN THE URINE.

By Dr. E. T. Wright.

The patient, a European sister of a religious order, aged 35, was resident in Freetown for fourteen years. In 1909 the patient had her first attack of



blackwater, and on convalescence was sent home to France for one year. She returned to Freetown and had a second attack in 1913; after recovering from this attack she relapsed within a month. In July, 1917, she was treated for amœbic dysentery with hypodermic injection of emetine, and had apparently recovered, when on the night of August 14 she felt chilly and out of sorts, but was able to continue with her duties. She was not in the habit of taking quinine regularly, but owing to her indisposition took 5 gr. of quinine before retiring to bed; at midnight she felt chilly and stiff, and the blackwater had established itself. She was seen on the morning of August 15, was passing typical blackwater frequently, vomiting bilious fluid and passing bilious stools. She was restless and had a severe headache, temperature 103° F., pulse 120, and already looking markedly anæmic.

Throughout that day she continued to pass plenty of the typical blackwater; all her symptoms were aggravated, especially the vomiting and headache. Dr. Mayer, S.M.O., W.A.M.S., kindly saw the patient in consultation with me, and on that occasion a specimen of urine was passed that looked like pure blood. It was decided to examine the urine to determine if the condition was not a hæmaturia instead of hæmoglobinuria. The only medicine the patient had been given so far was a mixture of liquor hydrarg. perchlor. and sodii bicarb. As the vomiting was so persistent, Dr. Mayer suggested giving the patient some glucose and sodii bicarb. per rectum; this was done. She made steady progress, interrupted chiefly by pyrexia.

On the next day, August 17, a specimen of urine was taken. It had already become much clearer, looked like light porter, was acid in reaction, with a heavy cloud of albumin on boiling.

On centrifugalizing the urine there was a copious deposit, white in colour, which on microscopical examination proved to contain no red blood corpuscles at all, but plenty of epithelial cells and an abundance of flagellates. The flagellates were very active, moved jerkily, apparently with the flagellar end foremost. The only time they seemed to stop was when they encountered some debris in the urine, and even then their flagellæ continued to move so rapidly that their contour could not be made out. Some of the centrifugalized urine was placed on a slide and allowed to evaporate in the incubator. After three hours the slides were stained with Leishman's stain.

On examination with the one-twelfth oil immersion the flagellates were found to be numerous and the slide full of bacteria. The flagellate consisted of a carrot-shaped body with two free flagellæ. The protoplasm stained uniformly, there was a centrally placed nucleus, consisting of masses of chromatin arranged circularly enclosing a clear area. In some of the nuclei a small dot of chromatin was clearly visible in the centre (fig. 2).

The blepharoplast was large and deeply staining, usually situate in the posterior third of the organism, and always lateral.

One of the flagellæ invariably seemed to arise from the blepharoplast; the other could not in every case be traced to the blepharoplast, but seemed occasionally to arise from a point opposite

the nucleus (figs. 4, 5, 6 and 7). Dumbbell-shaped bodies were observed in the stained specimen, one of them having a small dot of chromatin at each end suggesting the commencement of binary fission (figs. 10 and 11).

In two instances only one flagellum could be seen (figs. 8 and 9). This perhaps was accidental.

The figures in the plate were all drawn with the camera lucida. Fig. 12 represents two red blood corpuscles drawn under exactly the same magnification as the other bodies.

On the following day, August 18, a specimen of urine was taken in order to make some further investigations concerning the organism, but none could now be found, nor could any deposit be seen after centrifugalizing the urine. It was quite free from albumin, and markedly free from bacteria compared with the specimen of the 17th, in which the flagellates were found. After this date the patient became slowly convalescent, all the symptoms gradually lessening in severity. On September 2, when the convalescence seemed fully established, the patient had a relapse of her dysentery, passing over twenty stools during the night. The fæces were examined and found to contain blood, mucus, and both amœbæ and cysts, but there were no flagellates of any kind to be seen.

This case is reported because the *Prowazekia* found was certainly not *P. urinarius*. It resembled *P. asiatica* more closely, and was perhaps this species. *P. asiatica* has, however—as far as I am able to refer—never yet been described in the urine.

THE GENUS *ENDOPLASMA CASTELLANI*, 1914.

By S. L. Brug.

Captain, Dutch Indian Medical Service.

(From the "Instituut voor Tropische Hygiene," Amsterdam. Director: Dr. J. J. v. Loghem.)

In the course of an examination of the contents of a guinea-pig's cæcum by means of dry, fixed and Giemsa-stained films, I was struck by the presence of bodies closely resembling endoplasma. In fresh preparations of the same material large numbers of parasites were seen, moving about in the typical way of flagellates. Their bodies were elongate or oval, some of them terminating in a sharp-pointed tail. Neither flagella nor undulating membrane could be detected in the living parasite.

In the Giemsa-stained films some of the parasites clearly showed the main generic characters of endoplasma as described by Castellani [1, 2]: "a flask-like appearance"; numerous "non-stained roundish vacuoles"; a nucleus consisting of a large mass of chromatoid roundish granules, "in one specimen bacillary in shape"; no flagella nor cilia or undulating membrane. There were slight differences. In my films the vacuoles were less numerous and less regularly distributed through the protoplasma; the vacuoles showed more reddish staining, not organized matter, and more bacteria. Although Castellani does not expressly state this, I suppose that his Giemsa films were stained after dry fixation. ("In this case, in addition to the Giemsa method of staining, I employed the Heidenhain iron hæmatoxylin with, of course, previous wet fixation" [2].) I think there can hardly be any doubt that parasites as figured Nos. 1 and 2 are really endoplasmata. Besides these forms, a small number of parasites were observed, showing typical endoplasma structure, but which on closer examination were found to possess one or two thin and faintly staining flagella. Some of the flagellated as well as the non-flagellated parasites were more or less typically pear-shaped, so resembling chilomastix (figs. 3 and 4). In fig. 4 an undulating membrane and one flagellum are present. However, I could not detect a typical chilomastix with three flagella, an undulating membrane, and a cystotum in the Giemsa-stained preparations.

Flagella of intestinal parasites staining badly with Giemsa is a fact of common occurrence. The flagella of herpetomonas from the intestine of insects often remain uncoloured after a prolonged and intensive staining with Giemsa's solution, and are in such cases represented as white lines on a rose-coloured background in the otherwise wet-stained preparations.

The films of the contents of the guinea-pig's cæcum were stained about sixteen hours with a 10 × diluted Giemsa solution. Castellani does not give any particulars in this matter. It is possible that the absolute absence of flagella in his cases is due to the fact of the period of staining being taken too short.

It is evident that the parasites figured Nos. 1—4 belong to the same species. The structure of nucleus and protoplasma is the same, and the absence of flagella and undulating membrane is not a characteristic to rely upon. In the films the transitional forms between 1 and 4 were predominant.

In the preparations stained with iron hæmatoxylin after wet fixation the parasites appeared much smaller than after dry fixation. Irregular forms, as in fig. 1, were not found. Most of them were oval or round, and some showed a faintly coloured sharp-pointed tail. It soon became evident that I had to do with an infection with chilomastix, the complete organization of this genus being present in some of the parasites (figs. 5 and 7). It is not surprising that only a part of the parasites showed complete chilomastix structure. The flagella and the undulating membrane are very delicate structures, and probably often wholly discoloured when nucleus and protoplasma are well differentiated. Moreover, the great masses of bacteria are often an impediment for thorough observation. Many parasites showed a slight, faintly staining, but sharply limited protrusion on the side of the nucleus, suggestive of an undulating

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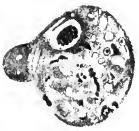

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To illustrate paper, "The Genus *Endoplasma Castellani*, 1914," by S. L. BRUG, Captain, Dutch Indian Medical Service.

membrane peering out of a cystotome (fig. 6), and so recorded their belonging to the genus *Chilomastix*. Small, round forms with three flagella, as described by Wenyon [3], were present (fig. 8). In some of them no flagella could be detected.

A closer observation of the Heidenhain-stained films proved that in the cæcum of the guinea-pig only chilomastix and no other protozoal parasites were present. There is no reason to separate the apparently non-flagellated or those with incomplete locomotory organs from the typical chilomastix.

In the course of my observations I noted that other flagellates besides chilomastix of the guinea-pig did often show badly stained flagella after the use of the Heidenhain mixture. In films from a rat's and from a mouse's cæcum with numerous trichomonads only a relatively small portion of the latter did show clearly three flagella. Many trichomonads, which otherwise were well stained, show no trace of flagella. Usually the parasites must be somewhat under-differentiated to show off these organs clearly. The presence of a certain number of flagella, and still more the absence of these organs as a generic characteristic, should be applied with utmost care; the absence of some or even all the flagella is no reason for the creation of new genera or species, if otherwise there is no difference in organization.

To summarize: In the dry-fixed, Giemsa-stained films parasites were found identical with endoplasma, which were connected by transitional forms with others strongly suggestive of chilomastix. The Heidenhain films proved that there was a pure chilomastix infection. Probably the human endoplasmata are no other than chilomastix. The large oval and irregularly shaped endoplasma is an artefact due to dry fixation.

I regret Castellani has not given figures of endoplasma, wet-fixed and stained with Heidenhain, so that I cannot compare these with my own findings.

The writer wishes to thank Dr. Swellengrebel, Zoologist of the Institute, for the keen interest taken in his labour.

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Explanation of Plate (Magn. $\frac{1800}{1}$ diam.)

Dry Fixation Giemsa Stain.

Figs. 1, 2. Endoplasma.
Fig. 3. Endoplasmata with flagella.
Fig. 4. Parasite suggestive of chilomastix.

Wet Fixation Iron-hæmatoxylin Staining.

Figs. 5, 7. Typical chilomastix.
Fig. 6. Dividing form (?).
Fig. 8. Small form.
Fig. 9. Small form without flagella.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JUNE 1, 1918.

AMŒBIC DYSENTERY PROBLEM.[1]

All who are in any way interested in the subject of amœbic dysentery will welcome the re-appearance, in its present neat form, of the well-known "Inquiry" of Wenyon and O'Connor. The investigations which form the backbone of the work were carried out in Egypt so long ago as the first half of 1916, and the "Inquiry" itself first appeared in print, in serial form in the *Journal of the Royal Army Medical Corps*, during the early months of

[1] "Human Intestinal Protozoa in the Near East. An inquiry into some problems affecting the spread and incidence of intestinal protozoal infections of British troops and natives in the Near East, with special reference to the carrier question, diagnosis and treatment of amœbic dysentery, and an account of three new human intestinal protozoa." By Temp. Lieut.-Col. C. M. Wenyon, R.A.M.C., and Temp. Capt. F. W. O'Connor, R.A.M.C. (Published for the Wellcome Bureau of Scientific Research by John Bale, Sons and Danielsson, Ltd, London, 1917.)

last year. The present work is a revised and collective re-issue of these instalments, supplemented by an appendix containing the more important histories of the cases studied. It bears the date 1917, but was actually not issued until March of the present year.

Since the investigations and views of the authors have thus been long known to all whom they concern; since there has been ample time to consider and weigh them—to subject the views to criticism, the investigations in many cases to the experimental test of renewed observation and inquiry; it is now possible to appraise the work as a whole more justly than we could have done at the time of its first appearance. The moment is therefore not inopportune for us to review the present position of the problem which the authors have attacked from so many different sides; and the time has, perhaps, already arrived when we can accommodate the mind's eye to a longer vision—directed backwards along the line of their predecessors, and forwards into the vista of future possibilities—and see, with some clarity, their achievements in a true historic perspective. To review, analyse, and criticize in detail the "Inquiry" itself would be to write a work of at least equal length. We shall not attempt it. Nor is it necessary: for we find that, on looking back upon the annotations, comments, and criticisms which almost every page of the work tempts us to write, there is hardly one which is not really an amplification, rather than a correction or controversion, of the authors' own statements. We have the feeling that we could, from our own experience, add something and multiply much; but that we could or would subtract but little. We conceive this to be a form of praise than which we could ask no higher for any work of our own.

It would be a profound mistake to regard the volume under consideration as the outcome—as it might appear—of a few months' work in Egypt. In reality it embodies the results of many years' labour, and is the last link in a long chain of investigations. The senior author, Col. C. M. Wenyon, had been engaged for some ten years previously in studying the intestinal protozoa of man; and he already possessed, before the War, a knowledge of facts and a degree of experience which few could rival. In the latter half of 1915, when the flood of patients invalided with "dysentery" from Gallipoli began to reach this country, he was almost the only worker here possessed of sufficient expert knowledge to undertake their investigation—from a protozoological standpoint—with a promise of instant profit. For some months prior to his setting out for Egypt, Col. Wenyon had been engaged—in civilian capacity, for the Medical Research Committee—in the protozoological investigation of the Gallipoli "dysenteries": and not merely in making personally a large number of routine examinations for purposes of diagnosis, but also in teaching others "the tricks of the trade," and in organizing and assisting in the necessary but novel work which pathologists and others in military hospitals all over the country suddenly found themselves called upon to perform. He thus went to Egypt armed with an almost unique knowledge of facts, conditions, and probabilities, after laying the foundations for the work of many subsequent investigators at home.

We lay some stress upon this latter aspect of Col. Wenyon's work, because there has been sometimes a tendency to forget it, and to ignore its connexion with the later work done in this country. Since the beginning of 1916 a large amount of work has been done in England, chiefly by workers for the Medical Research Committee, in continuation and elaboration of that which he initiated. This work has inevitably been directed into new channels, and into the investigation of problems differing in many ways from those which appeared most prominent three years ago. They were, however, implicit in the original investigations. And whilst, therefore, work in the field and work at home have since led to different conclusions in certain respects, these conclusions are neither opposed nor opposable. They are complementary to one another, and the result of inquiries conducted in a similar spirit.

If we have said so much about the senior author, it must not be presumed that we would, in any way, attempt to minimize the importance of the services rendered by his fellow-worker in the present investigation. In the phrase of Sir Thomas Browne, "a work of this nature is not to be performed upon one legge": and the support supplied by Capt. O'Connor's collaboration has contributed not a little to the stability of the work as a whole and to the permanence of its conclusions. A happier partnership could hardly have been conceived. We know all too well the "dirty work" inseparable from all such inquiries, and we have the best of reasons for believing that each worker did his fair share.

Except to those engaged in the study of amœbic dysentery, it is not, we think, generally known how great an advance has been effected in our knowledge as a direct consequence of the War. Much that was uncertain, or at least open to controversy, in 1914, has now been converted into definitely ascertained fact. Before the War it was still possible—though not altogether wise or justifiable—for critics to express the opinion that even the existence of a form of dysentery caused by amœbæ was debatable; that the existence of harmless and pathogenic species of amœbæ was an unverified hypothesis; that there was nothing to prove that the amœba supposed to cause dysentery, and the cysts found in the fæces and alleged to belong to it, were in any way connected; that the life-history of the parasite in question was so uncertain that one might hold almost any view one chose regarding it; that it was doubtful whether emetine was of any use as a cure for dysentery. These and many similar opinions were freely canvassed, and were, in some cases, difficult to refute conclusively on account of the paucity of credible witnesses. When many tell the same false tale it is apt to be believed in preference to the true story of one honest man—as though truth were not a quality but a quantity of evidence. The War, how-

ever, has given us not only the correct answers to these and many other questions, but it has also given us such a quantity of confirmatory testimony as to make them indisputable. Most of the old pseudo-problems are now anachronisms.

The main facts about the dysentery amœba itself are now known. The parasite—*Entamœba histolytica*, or, as the French workers prefer to call it, *E. dysenteriæ*—long puzzled its investigators. It presented many phenomena which appeared incomprehensible or contradictory to the early workers. They found, for example, many persons infected with intestinal amœbæ hardly distinguishable from *E. histolytica* but apparently harmless. Again, they found persons undoubtedly infected with *E. histolytica* itself, some of whom appeared to be in the best of health, whilst others suffered from the most severe dysentery. The two conditions might even be seen successively in the same individual. The fact that amœbic dysentery is a relapsing disease had long been recognized; but it was found that a patient who suffered periodically from acute attacks of dysentery, during which large numbers of amœbæ always appeared in his stools, might show no signs of the existence of these organisms in his fæces during the periods—sometimes long, and marked by no dysenteric symptoms—which intervened between the attacks. If the amœbæ caused the disease, as their abundant presence and constant reappearance seemed to indicate, where were they and what were they doing during the non-dysenteric periods? Again, amœbic dysentery, though endemic in certain regions, is not contagious in the ordinary sense. A patient suffering from acute dysentery, and passing immense numbers of amœbæ in his stools, does not give the disease to others: nor can the condition be reproduced in any animal by means of the amœbæ in any but the most artificial manner. The amœbæ themselves can be ingested with impunity. The disease can only be transmitted to a susceptible animal by introducing them directly into the large intestine—a process of infection unlikely to occur in nature.

The explanation of all these observations is now so obvious that it is almost difficult to believe that they ever appeared problematic: and it turns simply upon the proper appreciation of the habits of the amœba. *E. histolytica* is—unlike most parasitic amœbæ—a tissue parasite. It lives in and upon the living tissues of its host, and it can exist in no other way. This is the most important fact about the amœba—so far as man is concerned.

Now a parasite which feeds upon its host may obviously do so to a greater or less extent. The ideal condition for host and parasite alike is a state of equilibrium like that between Prometheus and the eagle—the former regenerating sufficient tissue each day to compensate the ravages of the latter. The "natural" condition of a man infected with *E. histolytica* is similar. His amœbæ feed, grow, and multiply at the expense of the living tissue lining his large intestine. Many of them every day encyst and pass out of the body with the fæces. The host's tissues regenerate with sufficient rapidity to supply the needs of those that are left. And so the man and the amœba may continue to live on terms of the greatest intimacy without either even suspecting the existence of the other. A human being in this state of Promethean equilibrium with his amœbæ is now called a "carrier": and there can be little doubt that this is the "normal" or most common condition of infection of human beings with *E. histolytica* in nature. The carrier can only be known by the presence of the cysts of the amœbæ in his fæces. Clinically he may, and often does, show no outward signs of the contest taking place in his gut wall. The ulceration which it produces is invisible to the eye, and leads to no functional derangement.

But the eagle may sometimes feed too fast for the recuperative powers of Prometheus to keep pace with him. The amœbæ devour more tissue than the man can regenerate. Destruction outruns construction, a disharmony or disturbance of equilibrium results, and then the trouble begins. The ravages of the amœbæ soon produce a state of dysentery in their host—blood and mucus flowing from the destroyed surface, carrying away many of the parasites, and being painfully evacuated by the host at frequent intervals in his attempt to get rid of the cause of the irritation. We thus have presented to us the picture of unhappy man in the throes of acute amœbic dysentery—no longer living at peace with his parasites, but engaged in a life and death struggle with them.

It is easy to understand how parasites possessed of such powers can, at one time, manifest their presence by producing the gravest pathological conditions; whilst, at another, their complete lack of harmfulness to their host makes even their presence pass unsuspected. It is easy also to understand how infection with the amœba may be accompanied by conditions ranging, with all intermediates, from the most acute and fatal dysentery to a state of apparently perfect health.

The carnivorous habits of *E. histolytica* also give us the key to the understanding of most of the characters—some of them at first sight extremely puzzling—which distinguish it from other species. How is it, for example, that other species of amœbæ, which structurally resemble it so closely, are never pathogenic? Simply because they feed upon the vegetable matter and débris contained in the intestine—not upon its tissues. They are harmless herbivores. How is it that the administration of emetine to an infected person will often rid him completely of *E. histolytica*, but will probably never eradicate the harmless amœbæ which appear to resemble it so closely? Simply because emetine is not directly toxic to amœbæ generally. Its action is primarily upon the host, and its effects are therefore manifested solely and specifically in the case of the amœba which feeds upon the host.

It is important to realize that the acute dysenteric condition is bad not only for the man but also for the amœba. In the carrier condition of equilibrium the amœbæ are able to pass their lives in a normal manner. So long as their ravages do not injure the

general health of their host their food supply is assured. So long as they do not seriously interfere with the functions of his bowels they have time to encyst and complete their development before being cast out of his body. Now the cysts of the amœbæ are the only means by which they can gain access to other human beings. Infection can occur in nature by a man swallowing a cyst—in no other way is it possible. A healthy carrier passing cysts in his fæces represents, therefore, an ideal condition of parasitism not only for the host but also for his parasites. He does not suffer appreciably, and they are given the greatest possible chance of reaching new hosts—of increasing their species and founding fresh colonies. In the dysenteric state, on the other hand, we see a very different picture: the host suffers, and the amœbæ are discharged from the body before they can encyst. They are thus unable to infect fresh hosts, and their line is doomed to extinction. If they produce a dysentery fatal to their host, they annihilate themselves automatically. Amœbic dysentery is thus a disharmony in nature—a pathological state not only for man but also for the amœbæ—a misfortune for them as much as for him. If the dysentery amœba were always to cause acute dysentery in every human being it infected, it would become extinct within a period of time immeasurably less than that necessary for its extermination by any conceivable human agency.

The foregoing considerations suggest, of themselves, the real practical problem connected with *E. histolytica*. They will also show how paradoxical this problem really is. We see a pathogenic parasite which occurs, in the majority of cases, in apparently healthy persons. Only the small minority of parasitized individuals are sick. In these, however, the parasites are found; in the former their presence will generally remain unknown. But the few sick men, whose infections will be brought to our notice, are not able to transmit their sickness to others; whereas the many healthy men, whose infections are generally unsuspected, are the real source of danger in this respect. They are also, to some extent, a source of danger to themselves, for they may at any time suffer and even die from dysentery, liver abscess, or some other consequence of the pathogenic activity of their parasites. What, then, is to be done with the infected individuals—both sick and healthy? How can such a state of things be remedied—or is there no remedy? Questions such as these may well exercise the minds of all who are charged with the care of the health of any community. But when this community happens to be an army in time of war, some practicable solution of them becomes imperative.

To find a practical answer to these questions was the chief object of Wenyon and O'Connor's "Inquiry"; but it led, of course, to the investigation of many subsidiary problems. In the first place it was necessary to ascertain the facts about the incidence of infection with the dysentery amœba among the troops—both healthy and dysenteric—in Egypt, and in the native population surrounding them. They found that both the healthy troops and the natives were parasitized to a considerable extent, but that the majority of the dysenteric patients were suffering not from amœbic but from bacillary dysentery. (Parenthetically we may note that the authors have concluded, from the information available to them, that the Gallipoli epidemic was not in the main amœbic dysentery—a conclusion with which, from our own observations in this country, we heartily agree.) This investigation involved, of course, the microscopic examination of the stools of large numbers of individuals; and it resulted, among other things, in the discovery of three new protozoal inhabitants of the human bowel—two new flagellates (named *Waskia* and *Tricercomonas*) and a new non-pathogenic entamœba (*E. nana*). The examinations had naturally to be made with accuracy, and fixed standards determined and adopted for purposes of diagnosis. Many interesting and important points in this connexion are discussed in detail. It will suffice to note here that the authors never diagnosed a case as infected with *E. histolytica* unless they found in the stools the characteristic quadrinucleate cysts of the parasite, or the amœbæ themselves containing ingested red blood-corpuscles—the brand of their carnivorous and pathogenic nature. The other amœbæ and the flagellates found in the human bowel were also studied in some detail in the course of this work. They are, however, of no practical importance, since they all feed upon the contents and not upon the substance of the intestine, and their presence can be regarded as "normal" in healthy human beings all the world over. The authors have done well to emphasize the existence of a normal protozoal fauna of this sort—unconnected with any kind of pathological condition.

We think that most people who have not been personally engaged in such work still fail to realize the extraordinary accuracy which is now possible in the diagnosis of amœbic infections. The microscopic examination of human fæces—scatoscopy, in a modern sense—has now become a science in itself; and the expert can now make diagnoses with a degree of accuracy and certainty which, only a few years ago, was quite unattainable. Much of the work on this subject has been carried out in this country, but much of it has been hitherto transmitted by word of mouth alone, and has yet to be committed to writing. To the literature of this science Wenyon and O'Connor have, however, already made some valuable contributions.

Another problem which was attacked was that of determining the best method of administering emetine—an alkaloid already widely known as a specific remedy for infection with *E. histolytica*. Their trials led them to conclude that a "combined method" of treatment with emetine hydrochloride—one grain hypodermically and half a grain *per os* daily, for twelve days—gives the best results. (At this time, of course, the double iodide of emetine and bismuth—which has proved so remarkably efficacious—had not been introduced by Dale; and no trials were made, therefore, with this drug.) It was found, however, "that the healthy or com-

paratively healthy carrier is much more easily cured of his infection than the acute case with actual dysentery, especially when there is a history of repeated attacks of dysentery." The sick men, therefore, whose cure is most urgent, are apparently just those who are, unfortunately, most difficult to cure. How far treatment with emetine in any form brings about a permanent cure—a complete sterilization of a patient from his infection with *E. histolytica*—had still to be determined. But we may note here that there is now good evidence that this can often be effected; though it seems certain, on the other hand, that when the amœbæ have once established themselves in the tissues of man they will, in the absence of specific treatment, remain there permanently.

The answer which Wenyon and O'Connor find for the main question at issue is based entirely upon grounds of expediency, having regard to the existing conditions and the necessities of warfare. It is impracticable they say—and justly—to examine and treat large numbers of healthy men. Improve and control your sanitation, so as to prevent them as far as possible from infecting one another and acquiring infections from the natives, but otherwise leave them alone. Each healthy man infected with *E. histolytica* is, it is true, liable to suffer from dysentery—is a potential casualty. But by no means every infected case *will* suffer from dysentery. Wait, therefore, until those who are going to fall out for this cause actually do so. Then attempt to cure them—clinically, at all events, if not absolutely—by the best methods of treatment, because it is now a matter of military importance to restore them as soon as possible to the ranks.

It will be seen that effective sanitation will play a prominent part in carrying out such a scheme; and the final part of the authors' work was therefore devoted to the investigation of one aspect of this matter. It dealt with the demonstration of the part which flies might play in conveying infection from man to man. The authors showed, by a series of interesting observations and experiments, that flies will devour human fæces containing cysts and pass them intact out of their own bodies after a surprisingly short interval of time. They even succeeded in capturing wild flies in Alexandria actually engaged in carrying cysts of *E. histolytica* in this fashion. It is thus possible that the fly may act as a spreader of infection by depositing the cysts upon human food, and the destruction of flies is therefore to be attended to if we would stop the dissemination of the parasite which causes amœbic dysentery.

It would take us far too long to consider in greater detail these and numerous other problems discussed or elucidated by the authors in the course of their inquiries. Some of them are old, some new; but all are important. We have said enough to show the general trend of their work and their conclusions, and it is no idle phrase of a lazy reviewer if we now end by saying that the entire work, to be properly appreciated, must be read in the original. Everybody will find in it a mass of facts and deductions from them which will invariably command his close attention and frequently call forth his criticism. If he accepts the authors' general conclusions, he will find himself tempted to consider how far they are capable of a wider generalization—how far recommendations adapted to a relatively small body of troops in Egypt are applicable to the Army as a whole, and to civil populations both at home and abroad. If, on the other hand, he looks at the problem in a different light, he may even be tempted to think that the authors have not solved but only shelved it successfully. And no matter how high a place we assign to Wenyon and O'Connor's work, no matter how completely we accept their conclusions, there still remain innumerable cognate problems for analysis and solution. Yet for our own part we have no doubt that this work will live long, and the names of Wenyon and O'Connor will come to hold an honourable place beside those of other workers whose partnerships have already become classical in the annals of amœbic dysentery—beside the names of Councilman and Lafleur, of Quincke and Roos, of Casagrandi and Barbagallo, of Walker and Sellards.

CLIFFORD DOBELL.

Abstract.

ORIENTAL SORE.[1]

By CECIL R. C. LYSTER and W. H. MCKINSTRY.

THE patient gave the following history:—

"I was in India from April 30 to July 18, 1917. August 11: Two days before reaching Marseilles a small pimple appeared where the lower sore now is. So far as I can remember I cut this while shaving, and at the same time I made a small cut where the upper sore is. I treated both these cuts with carbolized vaseline without effect. I think also that a little salt water got into them, as there was salt in some of the fresh-water tanks owing to bad weather. 13th: I applied some iodine without effect. 17th: On the day following upon my arrival in London both places appeared to have a little matter in them, and I treated them with antiphlogistine to draw out the inflammation. This appeared to make them worse, although some of the matter seemed to be removed. 18th: I left for Sussex, where I consulted a doctor. On his advice I cleansed the sores three times daily with hydrogen peroxide and applied boric acid powder. These remedies were unsuccessful. 29th: I consulted a doctor at a military hospital, and on his advice I applied an ointment of mercury. September 4: I endeavoured to clear up the upper sore with an application of strong iodine, but this only made it worse. The boils were bandaged since this day. 11th: I consulted you, and you know the subsequent history."

[1] Abstracted from the *Lancet*, February 23, 1918.

The patient on September 11, 1917, had a dry ulcerating swelling on the lower jaw to the right of the middle line, and another in the submaxillary region on the same side. Both ulcers were circular and about 1 in. in diameter. Their borders were raised, and their bases were covered with dry fissured crusts, beneath which a layer of thick pus could be seen. The raised edges were slightly indurated. The neighbouring lymphatic glands were not involved. The hairs on the bases and borders of the ulcers were easily, but not painlessly, extracted. Many of these hairs were examined for the presence of a fungus with negative results. A platinum loop was next inserted into the fissures near the borders of the ulcers and smears were made, stained with Leishman's stain, and examined microscopically. Numerous *Leishmania tropica*, the causative agent of oriental sore, were at once seen. Some of them were intracellular, but the majority lay in clusters quite free outside the cells. The urine was found to be normal. Blood counts were made on two or three occasions, but at no time was there any excess of hyaline cells. The malaria parasite was also absent. On each occasion a differential blood count gave approximately the following figures: Polymorphonuclears, 63 per cent.; small lymphocytes, 20 per cent.; large lymphocytes, 13 per cent.; hyalines, 4 per cent.

Treatment.

For the sake of brevity and simplicity we tabulate the treatment we tried in chronological order. September 11: One ulcer dressed with a solution of salvarsan, 1 in 1000. The other ulcer dressed with $HgCl_2$ solution, 1 in 1000. 16th: Ultra-violet rays applied and ulcers dressed with flavine. 27th: An ointment of pyrogallic acid applied to both ulcers. Iodine ionization commenced. October 4: Up to this time no appreciable change could be detected in either ulcer. Chlorine ionization was therefore tried, twenty minutes for each application, together with a hypochlorite dressing. In two days the crusts came away from the ulcers, leaving rather pale raw surfaces. This treatment was maintained until October 25, when the ulcers were practically healed, and subsequently until November 1. The size of the electrodes used was $1\frac{1}{2}$ by $1\frac{1}{2}$ in. on each ulcer, and the strength of current 20 milliampères.

Among recent remedies which have been tried with more or less success for this condition mention may be made of radium, salvarsan, carbonic-acid snow, tartar emetic, permanganate of potash, and methylene blue. In our case neither salvarsan, perchloride of mercury, pyrogallic acid, ultra-violet rays, flavine, nor iodine ionization appeared to make any impression on the sores. The benefit following on chlorine ionization and hypochlorite dressings was so striking, however, that we hope others who have the opportunity will put these remedies to a further test. From the time that this treatment was begun until the ulcers were soundly healed was just three weeks.

Notes and News.

BURMA AND MADAGASCAR BEANS.

The edible beans most commonly met with in Burma and Madagascar are varieties of *Phaseolus lunatus*, the kidney bean, of which we grow two varieties in Britain, the scarlet runner and the haricot bean. Burma (or as it is sometimes called Rangoon) beans are of two kinds, a small reddish bean and a white bean resembling small haricots. It has been found that the beans of the red variety contain prussic acid to some extent, so much so that there arose some hesitation in using them. The Madagascar bean, the "butter bean" of our tables, is of the same variety as the Burma variety—namely, *Phaseolus lunatus*, but contains little prussic acid, having lost through cultivation perhaps its power of producing this acid. An attempt has been made to introduce the Madagascar bean into Burma, in the hope that the bean in its new environment might continue to preserve the lessened quantity of prussic acid in its composition. For four seasons the butter bean has been grown in Burma, and although the beans are found to yield somewhat more prussic acid than the original beans, the quantity is negligible, and less than that yielded by the ordinary Rangoon beans.

ADULTERATED TEA.

In order to ensure that only genuine tea shall pass into the country, all consignments are examined at the ports of entry by inspectors approved by the Lords of the Treasury. Doubtful samples requiring a more complete examination are sent to the Government laboratory. The number of such samples dealt with in the year ended March 31, 1917, was 13,296, of which 1,172, representing 65,511 lb., were condemned as containing sand or other foreign matter. In addition, 488 samples, or 34,666 lb., were reported as "unfit for human consumption." There was, however, the Government chemist points out, no evidence of intentional adulteration, and it is to be noted that the quantity rejected, though large, is quite insignificant in relation to the total amount of tea imported, namely, approximately 369,000,000 lb., including tea for the manufacture of caffeine. Rejected tea is allowed delivery duty-free for use in the manufacture of caffeine or theine, the alkaloid which imparts to coffee and tea their stimulating properties, and which is extracted for use as a drug.

Trench Fever.—The researches of a Committee of investigators from the British and American Expeditionary Forces show that the bacillus of trench fever has not yet been found, but that the louse has been proved to be the cause of the spread of this disease. Trench fever and scabies have been the cause of more sickness among the troops in France than any other two diseases.

Original Communications.

THE CLASSIFICATION OF THE MYCETOMAS.

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AND
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CONTENTS.—*Introductory—The Mycetomas—The Maduromycoses—The Actinomycoses—References.*

Introductory.—The subject of the Mycetomas has formed part of the work of these laboratories for several years, and the results have from time to time been published in various journals. No single paper, however, has been issued by us dealing with the classification of the known mycetomas, and therefore we venture to bring forward this short note.

In making a classification we clearly recognize that it is only a thing of the moment, and that all classifications are ephemeral, but we also know, by personal experience, how helpful it is to gather together in condensed form and from time to time our own knowledge on any subject, but in doing so for the mycetomas we feel that it is necessary to be quite clear as to what we mean by certain terms, and therefore we begin our classification with three definitions, viz., those of Mycetoma, Paramycetoma, Pseudomycetoma.

The term *Mycetoma* includes all growths and granulations which produce enlargement, deformity, or destruction in any portion of the tissues of man or animals, and which are caused by the invasion of the affected area by fungi belonging to different genera and species, which produce bodies of varying dimensions, colour and shape composed of hyphæ, and sometimes chlamydospores, embedded in a matrix. These bodies, which are capable of giving rise to mycelial filaments on germination, are termed *grains*, and are found either embedded in the pathological tissue forming these growths and granulations, or escaping freely in the discharge therefrom. In addition, eosinophile bodies can usually be seen.

The term *Paramycetoma* includes all growths and granulations producing enlargement, deformity and destruction in any part of the tissues of man or animals which are caused by the presence of fungi of any nature whatsoever, but in which grains are either entirely absent or are so few in number and small in size as to escape observation without prolonged search, and in which eosinophile bodies are readily seen.

The term *Pseudomycetoma* includes all growths which, though clinically resembling a typical mycetoma by the presence of swelling, ulceration and discharge, differ therefrom in the absence of grains in the tissues and in the discharge, and moreover are different from the *Paramycetoma* in that neither fungal nor eosinophile bodies can be found in the tissues or in the discharge.

During the past few years we have examined a number of specimens from cases which clinically resembled those caused by malignant tumours. Pathologically we have found these tumours to possess the characters of atypical epitheliomata and rodent ulcers, and in some at least of these we have found evidence of fungal infection.

These specimens, considered in the light of the cultural work of the Leytons (*Journal of Pathology*, December, 1916), who found nocardias in cases of typical carcinomata in England, become interesting, and will form the subject matter of another communication, as the present paper is merely the first of a proposed short series.

Having thus cleared the ground as to what we mean by the term Mycetoma, we may proceed with the classification of the Mycetomas.

The *Mycetomas.*—The Mycetomas may be divided into two classes, viz., the *Maduromycoses* and the *Actinomycoses*, which may be defined as follows:—

The *Maduromycoses* are those forms of Mycetoma with grains composed of large segmented mycelial filaments possessing well-defined walls, and usually chlamydospores.

The *Actinomycoses* are those forms of Mycetoma with grains composed of very fine non-segmented mycelial filaments, in which usually the walls are not clearly defined from the contents, and in which chlamydospores are absent.

The *Maduromycoses.*—This group of the Mycetomas may be divided into sub-groups according to the colour of the grain, and further subdivided according to geographical distribution by the Continent in which the Maduromycosis occurs, and still further split up according to the causal organism.

Applying this method of classification we obtain the following tables:—

I. The *Black Maduromycoses*, with black grains.

II. The *White* or *Yellow Maduromycoses*, with white or yellowish grains.

III. The *Red Maduromycoses*, with red grains.

I. The *Black Maduromycoses.*

These may be divided into:—

A. The *European Black Maduromycoses.*
B. The *African Black Maduromycoses.*
C. The *Asian Black Maduromycosis.*
D. The *American Black Maduromycoses.*

A. The European Black Maduromycoses:—

(1) *Bassini's, Köbner's* and *Schmincke's Black Maduromycoses* respectively found in Padua, Italy (we are unacquainted with the particular locality), and in Kissingen, and of which the nature of the ætiological fungus is unknown.

(2) *Bovo's Black Maduromycosis*, found in Genoa, and of which the causal agent is called *Madurella bovoi* Brumpt 1910, but this identification must be accepted with reserve as the fungus has never been cultivated, and may not agree with the definition of the genus Madurella, as altered by Pinoy in 1912 subsequent to the cultivation of *M. mycetomi* and *M. tozeuri*.

(3) *Pepere's Black Maduromycosis*, found at Domusnovas in the Province of Cagliari in Sardinia, and caused by *Scedosporium sclerotiale* Pepere 1914.

B. The African Black Maduromycoses:—

(1) *Brumpt's Black Maduromycosis* caused by *Madurella mycetomi* (Laveran 1902).

(2) *Nicolle* and *Pinoy's Black Maduromycosis* caused by *Madurella tozeuri* (Nicolle and Pinoy 1908).

(3) *Bouffard's Black Maduromycosis* caused by *Aspergillus bouffardi* Brumpt 1905.

(4) *Chalmers and Archibald's Black Maduromycosis* caused by *Glenospora khartoumensis* Chalmers and Archibald 1916, which has now been recovered three times in the Anglo-Egyptian Sudan.

These African Black Maduromycoses may be differentiated from one another as follows:—

A. Microscopical preparations show aspergillar heads	*Bouffard's Black Maduromycosis.*
B. Microscopical preparations do not show aspergillar heads; on culture the following types of spore are obtained:	
1. The aleuriosporal form of conidium	*Chalmers and Archibald's Black Maduromycosis*
2. The arthrosporal form of thallospore:	
a. Mycelium greyish white, when old, yellowish and darkening the media in sugar cultures. Spores varying in dimension from 2 to 5 microns. Grains black and sterile, with a diameter from 0·5 to 1 millimetre, formed in the depths of the medium in cultures. Can invade the skin, bone, muscles and connective tissue of man, giving rise to black grains which are small, hard, round and more or less warty, and which morphologically resemble the grains formed in the cultures. Up to the present the inoculation into animals is negative. Very widely spread in Africa. Isolated by Brault from a Mycetoma with black grains in Algeria.	*Brumpt's Black Maduromycosis*
b. Mycelium white, becoming yellowish with age and darkening the medium in sugar cultures. Spores generally small, 2 microns or sometimes even 5 microns in diameter. Grains are only rarely produced, and then they appear on the surface of the medium. Occasionally it gives rise to a Mycetoma in man, in which it forms black amorphous grains which are often made up of mycelial rings enclosing some degenerate cellular elements which are impregnated with the pigment of the fungus, and also of small diffuse masses formed solely by the filaments of the fungus which have a yellow membrane. Inoculation into pigeons positive. Isolated by Nicolle from a Mycetoma at Tozeur.	*Nicolle and Pinoy's Black Maduromycosis*

C. The Asian Black Maduromycosis:—

There is only one type known at present, viz.:—

Carter's Black Maduromycosis caused by *Glenospora semoni* Chalmers and Archibald 1917, which can be readily differentiated from *Glenospora khartoumensis* Chalmers and Archibald 1916, by the following characters:—

(1) Grown on clear maltose agar in Khartoum after twelve days in an uncapped tube at 30° C.

G. semoni produces a cupola-shaped, large, central black mass with an outlying fringe of white.

G. khartoumensis produces a black growth, consisting of a central crumpled ridge or hillock placed on a grooved black plateau, and with hardly any white fringe.

(2) and (3) Grown on glucose agar and blood serum; there are marked differences between the two fungi.

D. The American Black Maduromycoses:—

(1) *Wright's Black Maduromycosis.*

This was found in the United States in an Italian woman who had left Italy, where Black Maduromycosis occurs, an indefinite number of years before the onset of the malady. The systemic position of the causal fungus is unknown.

(2) *Scheult's Black Maduromycosis.*

This was found in the West Indies in a native of India, who had left this country twelve years before the onset of the malady. The nature of the causal organism is unknown.

II. The *White* or *Yellow Maduromycoses.*

These may be divided into:—

A. The *European White Maduromycoses.*

B. The *African White Maduromycosis.*

C. The *Asian White Maduromycosis.*

A. The European White Maduromycoses:—

(1) *Brumpt and Reynier's White Maduromycosis* caused by *Indiella reynieri* Brumpt 1906, with a large *soft* grain, and found in Paris.

(2) *Tarozzi and Radaeli's White Maduromycosis* caused by *Scedosporium apiospermum* (Saccardo 1911), with a small *rather*

hard and yellowish grain, and found in Sardinia and Italy.

B. The African White Maduromycosis:—
Nicolle and Pinoy's White Maduromycosis due to *Sterigmatocystis nidulans* (Eidam 1883), with grains of size varying from those which are almost microscopic to others about the size of pea, of rounded or polyhedral form, and of variable colour, being dirty white or yellowish white, and *soft* in consistence, and found in Tunisia.

C. The Asian White Maduromycosis:—
Brumpt's White Maduromycosis due to *Indiella mansoni* Brumpt 1905, with very small and *very hard* white grains, and found in India.

The differentiation of the White Maduromycoses may be effected as follows:—

A. Grains soft:	
1. Sterigmatocystic heads found in grains and in cultures. Grains *not* like a ribbon rolled on itself.	*Nicolle and Pinoy's White Maduromycosis.*
2. No such heads to be found in the grains which are like a ribbon rolled upon itself.	*Brumpt and Reynier's White Maduromycosis.*
B. Grains hard:	
1. Grains small yellowish not reniform; spore of the type of a conidium.	*Tarozzi and Radaeli's White Maduromycosis.*
2. Grains small, whitish, reniform; spore of the type of an arthrospore.	*Brumpt's White Maduromycosis.*

III. The *Red Maduromycosis.*

Only one form is known:—

Balfour and Archibald's Red Maduromycosis, which was possibly due to an aspergillus, because aspergillar-like heads were found in the grains. It occurred in the Anglo-Egyptian Sudan.

This completes the list of the Maduromycoses known to us, and we now turn to the Actinomycoses.

The *Actinomycoses.*—These Mycetomas are capable of classification by the colour of the grain, and by the causal organism and its characters.

By the colour of the grain they may be classified into:—

I. The *Black Actinomycosis*, with black grains.

II. The *White* or *Yellow Actinomycoses*, with white or yellow grains.

III. The *Red* (sometimes *Yellowish*) *Actinomycosis*, with red (sometimes yellowish) grains.

I. The *Black Actinomycosis.*

Only one variety, found in Europe, is known, viz.:—

Babés and Mironescu's Black Actinomycosis, of which the fungus has never been classified.

II. The *White* or *Yellow Actinomycoses.*

These may be differentiated by the characters of causal organisms into:—

A. Fungus difficult of cultivation, grows best anaerobically, arthrospores absent,

(*a*) Yellow grains:—
(1) *Israel's Yellow Actinomycosis*
(*b*) Very small white grains:—
(2) *Ravant and Pinoy's Yellow Actinomycosis.*

B. Fungus grows readily aerobically and produces arthrospores.
(*a*) Clubs present:—
(3) *Acland's Yellow Actinomycosis.*
(*b*) Clubs absent.
(*c*) Hard sheath around grains:—
(4) *Bouffard's Yellow Actinomycosis.*
(*f*) Hard sheath absent.
(*m*) No growth on gelatine.
(5) *Krause's Yellow Actinomycosis.*
(*n*) Growth on gelatine.
(*o*) Blood serum not liquefied:—
(6) *Eppinger's Yellow Actinomycosis.*
(*p*) Blood serum liquefied.
(*x*) Pathogenic for laboratory animals:—
(7) *Garten's Yellow Actinomycosis.*
(*y*) Non-pathogenic for laboratory animals.
(*w*) Gelatine liquefied:—
(8) *Hesse's Yellow Actinomycosis.*
(*z*) Gelatine not liquefied:—
(9) *Chalmers* and *Christopherson's Yellow Actinomycosis.*

With reference to *Nocardia convoluta* Chalmers and Christopherson 1916, we may state that it has now been grown five times in Khartoum.

III. The *Red* (sometimes *Yellowish*) *Actinomycosis.*

There is only one known variety, viz.:—
Carter's Red (sometimes Yellowish) *Actinomycosis*, of which the causal organism is *Nocardia indica* (Kanthack 1893).

This completes the Mycetomas occurring in man and known to us, and for further details on the causal fungi, and especially with regard to their classification, and also more particularly to that of the Nocardias, reference may be made to the papers quoted below.

Khartoum,
January 19, 1918.

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TRENCH FEVER.

To the growing list of insect-borne diseases yet another has been added—namely, the Trench Fever of armies in the field. The gradual recognition of this ailment as a distinct and definite entity was bound to lead to closer investigation of its natural history, and it is satisfactory to know that under a Committee appointed by the British military authorities this has been accomplished. The results of the work of the Committee were unfolded at the meeting of the Society of Tropical Medicine and Hygiene on Friday, May 17, 1918. The work on which this paper is based has been carried out at Hampstead for the War Office Trench Fever Investigation Committee, of which Major-General Sir David Bruce, K.C.B., F.R.S., A.M.S., is Chairman. The members are: Lieutenant-Colonel D. Harvey, C.M.G., R.A.M.C.; Professor H. Plimmer, F.R.S.; A. W. Bacot, Esq.; Major W. Byam, R.A.M.C.; Lieutenant-Colonel H. French, R.A.M.C. (Temp.); J. A. Arkwright, Esq.; Sir P. M. Fletcher, K.B.E., F.R.S.; Lieutenant A. F. Hird, General List (Temp.), Secretary. The paper is entitled "Trench Fever: a Louse-borne Disease," by Major W. Byam, R.A.M.C.; Captain J. H. Carroll, U.S.R.; Lieutenant J. H. Churchill, R.A.M.C.(T.); Captain Lyn Dimond, R.A.M.C.; Lieutenant Ll. Lloyd, R.A.M.C.; Captain V. E. Sorapure, R.A.M.C.; Lieutenant R. M. Wilson, R.A.M.C.

The part played by the body louse—*Pediculus humanus*—has so far constituted the chief part of the work of the Investigation Committee, whilst great attention has been paid at the same time to systematizing our knowledge of a disease which has hitherto been a mystery and an unclassified affection. That the name trench fever will endure is doubtful, except in a popular form, for this affection must have existed since man was first infected by lice and the trench system of fighting unknown.

Lice and scabies have been a scourge of armies in all times, and more especially when campaigns were of long duration and when winter quarters were necessary owing to the climate rendering extensive operations in the field impossible; and the consequent huddling together of men in close quarters, whether in camps, in huts, or billets in villages or towns. The two infections are, moreover, complementary the one to the other, for an infection by the *Acarus scabiei* presents skin lesions favouring the infection by trench-fever-infected *Pediculus humanus;* the cutaneous lesions caused by the burrowing itch insect and the scratching these induce ensure inoculation of trench fever if the virus of the infected louse is present. The acarus is the jackal, as it were, for the Pediculus in this instance; but not an absolutely necessary provider, for pediculosis causes sufficient scratching of itself to ensure a pathway for infection independently of the burrows formed by the itch insect. At least it would appear so, although we are ready to believe even that the one is perhaps the necessary forerunner of the other, so frequently are the two parasites met with acting in company.

The hitherto indefinite and altogether apparently irrelevant signs and symptoms of trench fever have been systematized by the Committee, and presented to us in a manner which serves at least to form a basis for further investigation and observation. We are told that there are two stages of the ailment trench fever, judging by a study of the pyrexia present. The *first or initial* form shows three febrile types: *(a)* The most common is a three-day fever, more or less continuous, followed by recovery; *(b)* a three-day fever—then a three- (or

more) day afebrile state—followed by a relapse of irregular fever; (c) a continuance of the original fever without an afebrile interval. The *second or late form* of trench fever succeeds the first or initial state, it may be after many months; the feverishness in the second form is accompanied by pains in limbs and back, headaches and mental depression, sweating, irregular heart action, anæmia, loss of weight, and invalidism of uncertain duration.

The first form of the ailment may be so mild as to be unrecognized, or if more pronounced it is apt to be put down to influenza. The temperature during this stage pursues an irregular remittent and intermittent type, and may last for as long as four weeks. In the second stage the temperature is intermittent, consisting of an occasional and temporary burst of fever lasting but a few hours, a so-called single "spike" which does not recur, or, on the other hand, a series of "spikes" may recur for as many as five consecutive days. It may at once be stated that up to the present moment no causative organism of trench fever has been found; this is no reason, however, for causing the transmission of the disease by insects to be annulled; for we have always before us (when such a confession leads some to being sceptical of investigation results) yellow fever and its transmission by mosquitoes, although no organism has been found, and perhaps never will be.

So far three diseases have been definitely traced to lice infection, viz.: Typhus exanthematicus, relapsing fever, and now trench fever, and it is possible that several others, especially ailments of children hitherto unexplained, are traceable to the same source.

In trench fever it is not the head-louse (*Pediculus capitis*) nor the crab-louse (*P. pubis*), but the body- or clothes-louse (*P. vestimenti*) that is regarded as the chief source of trouble, and to the destruction of this variety must all efforts be devoted as the means of prophylaxis, and this important point has not been neglected by the Committee. Anyone who "knows" the Front, and has seen the great care taken in the disinfection of clothes there, cannot accuse the medical military authorities of neglect in this matter. Without the knowledge that the greatest scourge of the Army—namely, trench fever—was directly due to the louse, pains, infinite pains, have been taken to deal with vermin-infected clothing, not at the base hospital, but even in the casualty clearing stations within three or four miles of the Front. Here the vermin-infected men are isolated and treated by baths, whilst their clothing is disinfected by the most modern forms of apparatus. Nothing has been neglected; although all has been done whilst yet the accurate knowledge of the ailments these vermin spread was not forthcoming; now that the connection between the louse and trench fever is ascertained, more care still, if that is possible, will no doubt be taken, and the thoroughness of disinfection necessary rendered yet more complete. Just as mosquito nets were used before it was known scientifically that the mosquito conveyed disease, so disinfection of clothing was used at the Front as a prophylactic before the intimate connection between the louse and trench fever was definitely proved. It was ever thus. Vermin has been hated by mankind long before the microscope showed the reason for the hatred which had become a second nature, a mania with many. The woman stood on a chair and screamed when she saw a rat or mouse long before we knew it was the rat that spread plague; yet was her instinctive dread correct, for with our modern knowledge we know the scientific reason for her screaming. The woman's instinct, the race-memory which is hers, had come down through the ages from Biblical times, when the connection between plague and rats was well known and acted upon. The Biblical teaching was forgotten for thousands of years—in fact, until 1894, when the connection between the rat and plague became evident and was proved scientifically; yet woman's instinct kept the fact alive, although inexplicable, until in recent years the reason was scientifically explained. Thus with all diseases, the verminous animal has been "detested, shunned by saint and sinner" through the ages, and the reason of the race-memory is being borne out by fresh evidence daily, and, to the many already proved, the connection between the louse and trench fever is now furnishing fresh evidence, if such were needed, of the necessity for cleanliness, the destruction of vermin, and the enforcement of sanitation and sanitary laws, without which all attempts to fight disease is vanity.

Annotations.

Spirochætosis without Jaundice (Favre and R. Mathieu, *Bulletins de la Société Médicale des Hôpitaux*, December 21, 1917).—Seven men had spirochætes constantly in their urine, up to six weeks in one and for three months in two. All looked thin and pale and complained of vague pains, and were incapable of work; over the cheek bones the skin was red, but elsewhere was brownish. One man had a hydrarthrosis resistant to the salicylates; another succumbed to severe nephritis. The congestion of the skin was so marked in one case that scarlet fever was diagnosed at first. The spirochæturia was constant at first, but became intermittent later.

Hypertrophy of the Prostate (R. Cinaglia, *Polyclinic*, December).—Palliative measures are moderation in eating and drinking, avoiding long trips in trains and vehicles, horseback riding, and everything else liable to induce congestion in the prostate. No alcohol, no chilling should be allowed, and the bowels should be kept loose. The bladder should be emptied frequently, not allowing the urine to collect and distend the walls, and the functions of the skin should be stimulated with tepid baths, douche, rubbing and massage. Potassium iodide should be given internally for months or a year. Under strict hygiene it may be possible to ward off further trouble, and even if "catheter life" becomes indispensable, this managed properly may

keep the man in the best of health for years. Guyon says it can be kept up for ten or twenty years. If operative treatment is unavoidable, the technic indicated by the special indications should be selected, but prostatectomy should not be attempted if there is severe purulent cystitis. The bladder can be opened and drained, but the temptation to remove the prostate should be controlled until the cystitis has healed. It was done in one case and the patient speedily succumbed to pelvicellulitis, thrombophlebitis and sepsis which followed the prostatectomy done in a field of purulent cystitis.

A Disease in Cattle in the Philippine Islands similar to that caused by Anaplasma marginale Theiler (W. H. Boyton, *Philippine Journ. Science*, Section B., November, 1917).—The cattle presented the symptoms, post-mortem lesions, and bodies in their red blood cells similar to those described by Theiler. It is not certain that this is an actual infection or whether these bodies are secondary effects from various conditions. REFERENCES: Balfour, A., "Anaplasmosis in Donkeys," *Journ. Comp. Path. and Therap.* (1911), xxiv, 44 to 47. "Jowett, W., "Anaplasmosis in Donkeys," *Journ. Comp. Path. and Therap.* (1911), xxiv, 40 to 44. Spreull, J., "Anaplasmosis in Donkeys," *Journ. Comp. Path. and Therap.* (1909), xxii, 4 to 351. Theiler, A., First Report Director Veterinary Research, Department of Agriculture, Union of South Africa (August, 1911).

Distribution of Spirochæta Icterohæmorrhagiæ in Organs after Intravenous Serum Treatment (R. Kaneko and K. Okuda, *Journal of Experimental Medicine*, February).—The immune serum of Weil's disease is capable of destroying the spirochætes found within the organs in man, with the exception of the kidneys, and that the action of the serum on the spirochætes is spirochætolytic and spirochæticidal. The scattered spirochætes in the kidney, on the other hand, are resistant to the action of the immune serum. The spirochætes disappear almost completely from the organs during the convalescent stage of Weil's disease, even when no serum has been administered. The only organ to be excepted is again the kidney, but no comparison between serum-treated and non-serum treated cases should be made in this respect, for spirochætes are found numerously in the kidneys even with serum treatment. The disappearance of the spirochætes from the organs and tissues in Weil's disease seems to be not so marked with the subcutaneous serum treatment as with the intravenous method, but the manner of their disappearance is about the same.

Observations on Bird Malaria and the Pathogenesis of Relapse in Human Malaria (C. R. Whitmore, *Johns Hopkins Hospital Bulletin*, March, 1918).—In malaria the body produces antibodies which resist the multiplication of the parasites. But certain of the parasites become resistant to these antibodies (or to quinine) and continue the asexual cycle, the number of parasites, however, being too small to produce symptoms. When anything happens to lower the resistance of the body these parasites are able to multiply rapidly and produce symptoms—that is, a relapse. The continuation of gametocytes is due to the continuation of the asexual cycle. As long as the infection continues the body is stimulated to produce antibodies, and the infected person is resistant to superinfection—that is, there is a labile infection. There is no immunity after recovery; as soon as the infection is stopped by the antibody production, or by treatment, the stimulus to antibody production is withdrawn, and the person is susceptible to infection, just as though he had never been infected before.

The Spinal Fluid in Typhus (D. Danielopolu, *Annales de Médecine*, October, 1917).—Of sixty typhus patients at Jassy the nervous disturbances were responsible for the deaths much oftener than the cardiac. Lumbar puncture was done every few days, in twenty-four typhus patients with more or less serious nervous symptoms. In the majority of the cases the more intense nervous phenomena coincided with a high leucocyte count and a complete and pronounced reaction on the part of the meninges. The globulin reaction and the lymphocytosis seem to be the result of augmented permeability of the meninges on the one hand, and of the leucocytosis in the blood on the other. In some cases the leucocyte count was very high, up to 60,000, but there was no meningeal reaction, and the patient did not show any serious nervous disturbances. Evidently the meninges were not much permeable. Two other patients presented from the very first grave nervous disturbances; the meninges were extremely permeable, but there was pronounced leucopenia and no signs of a meningeal reaction.

Spirochæte Jaundice (P. Pagniez, *Bulletins de la Société Médicale des Hôpitaux*, November 30).—The spirochæte was found in forty-five of eighty-seven cases of jaundice in soldiers. The reddish saffron tint of the jaundice is the combination of the yellow jaundice and the red vaso-dilatation in the skin. The latter may be pronounced even when there is no icterus; in the severer cases the colour was like that of a ripe pomegranate; pruritus was rare; tardy bradycardia was common. The pigments in the spirochæte urine seem to be especially unstable. If a drop or two of acetic acid is added to a test tube containing a few cubic centimetres of urine and it is heated as for the albumin test, the acidified portion of the urine turns a bright green. This occurred only between the fifth and eighth day. Epistaxis was present in thirteen cases and was the only form of hæmorrhage. The blood clot failed to retract, and the proportion of platelets was much below normal. The changes in the blood were noted early, even before the jaundice, and they may aid in the differential diagnosis. During convalescence the pallor, the persisting jaundice and the falling of the hair were striking features,

Alopecia followed in twenty-one of twenty-six cases; it resembled in every respect syphilitic alopecia.

Typhus at Paris (A. Netter, *Bulletin de l'Académie de Médecine*, January 29).—Typhus fever occurred in a family of ragpickers. Two brothers of 12 and 14 seemed to have typhoid when they entered the hospital, but the patches of roseola seemed rather larger than those of typhoid, and a little darker in colour. Six members of the family were affected and all recovered; but a father died in another family in which three members were affected. All of the nine patients had lice when they entered the hospital, but they were freed from the vermin, and no further contagion occurred. There are no pathognomonic signs of typhus; the exanthem is fleeting and may not appear at all, but the stormy onset, the rapidity with which the fever reaches its height, the slight differences between morning and evening temperature, and the comparatively short course, the temperature subsiding rapidly in a day or two, the accentuation of the nervous phenomena, the habitual rarity of intestinal symptoms and the relative frequency of complications, parotitis and gangrene, should arouse suspicion. In case of death, the relatively early date and the absence of intestinal lesions should confirm the suspicion. Probably typhus has never died out entirely in Paris. In 1916 nine cases, all at the same time, were found in children who had been in the scarlet fever ward for a month. The retrospective diagnosis was mild typhus, Brill's disease.

Treatment of Delirium Tremens (H. H. Hoppe, *Journal of Nervous and Mental Diseases*, February).—The routine treatment for delirium tremens employed in the Cincinnati General Hospital is catharsis calomel, followed by a rather large dose of Epsom salts. Tincture of digitalis and tincture of nux vomica, 10 drops of each, are given by mouth every three hours. In the active state of delirium strychnine and digitalin are given hypodermatically; this stimulation is the most essential part of the treatment. In mild cases the indication for alkalies is met by the use of the imperial drink with lemon juice. Prolonged hot baths and hot packs are given twice a day, chloral and bromides are given only at night, and then not more than two or three doses during the twelve hours. In ordinary mild cases of delirium tremens, uncomplicated with kidney trouble, the above treatment is sufficient, and the disease runs a very mild course. In the more severe cases, and at present a routine treatment, spinal puncture is resorted to as soon as the patient begins to have hallucinations. From 30 to 60 c.c. are usually withdrawn. The withdrawing of the fluid is followed by a rapid reduction of the delirium, especially in cases which have had preliminary stimulation and alkalinization. If the delirium returns spinal puncture is repeated. If the delirium still continues notwithstanding the spinal puncture, or if the patient is pale and covered with perspiration with a low muttering delirium, an intravenous injection of physiologic sodium chloride solution is given, or what has been found to be of more use, especially in cases with frequent convulsions and deficient kidney function, Fisher's solution. Of 105 cases, which seemed clinically uncomplicated, eight patients died, a mortality of 7·6 per cent. During the previous ten years, when the routine treatment was catharsis and sedatives, the mortality was 18·5 per cent.

Some Principles of Anthelmintic Medication (M. C. Hall, *New Orleans Medical and Surgical Journal*, February).—Anthelmintics are selective in their action; at least their dependable effectiveness is limited to certain sorts of worms. Certain kinds of worms require not only a suitable anthelmintic, but also suitable modes of medication, whereas other worms only require the simple administration of a single therapeutic dose of a suitable drug. The ascarides, which inhabit the small intestine and lie unattached in the lumen, are readily accessible to the ordinary types of anthelmintics. The hookworms, which attach for indefinite periods to the intestinal mucosa and occasionally detach and remain free in the lumen of the intestine for a time before attaching again, show a response to anthelmintics which may perhaps be correlated with this habit of attaching and detaching. The whipworms, located for the most part in the cæcum, are apparently not always exposed to the action of anthelmintics even when adequate doses of potent drugs are given. Fluid extracts or other preparations using alcohol as a solvent for active anthelmintic ingredients are frequently unsuitable as anthelmintics. These alcoholic preparations are often rapidly absorbed, largely in the stomach and duodenum, occasioning more or less irritation at the point of absorption and producing systemic effects of a more or less toxic nature. The considerable and rapid absorption leaves a comparatively small amount of drug available for actual anthelmintic action, and by the same token leaves the minimum of drug that could possibly be removed by purgation after exerting its anthelmintic effect. Anthelmintics of the supposedly insoluble type are not as insoluble as they are commonly supposed to be.

There are two factors to be considered in connection with the rate of absorption. One is the local effect of rapid absorption, and the other is the systemic effect. When such toxic drugs as anthelmintics are rapidly absorbed, it means that the brunt of the irritation and insult due to the drug is borne by a rather limited section of the digestive tract; that a large amount of comparatively concentrated drug is taken in over the gastric and duodenal mucosa, and possibly by that of the upper jejunum. It would appear that what is desired in anthelmintic administration is, first, as little absorption as possible; and second, since there must be some absorption, probably a large amount as a rule, it is desirable to retard that absorption in order to distribute it over as large a surface of the gastro-intestinal mucosa as possible and to allow the maximum time for the body gradually to dispose of the drug by oxidation and elimination. Some anthelmintics do

not need to be allowed "time to act" on the worms before purgatives are administered. The above proposition is stated tentatively. Preliminary fasting is important. Gastric stasis might occasionally interfere with the efficacy of anthelmintics. The passage of worms following anthelmintic treatment is a better indication for repeating or continuing treatment than for stopping treatment. Severe helminthiasis calls for caution in administering anthelmintics. While the majority of worms passed after anthelmintic treatment come away in the first twenty-four hours after treatment, there is a fairly large percentage which will commonly come away from one to six or seven days later.

Observations on Typhus-infected Lice (Da Rocha-Lima, *Arch. für Schiffs und Trop. Hygiene*, vol. xx, No. 2).—The author has carried out a series of researches on the so-called organism of typhus, described by Prowazek, in the body louse. A large number of smears, and also sections of body lice obtained from typhus cases, were examined, as were also lice taken from persons not suffering from typhus, and classed as normal. The organisms found by the author in the lice obtained from the cases of typhus possessed affinities with bacteria and also certain other organisms. Variations were observed in their morphology, and these showed as coccus-like bodies or rod-shaped and ellipsoidal forms. It was discovered that the organisms did not stain well with the usual bacteriological stains, and that the best results were obtained by Giemsa's method of staining. With Giemsa the bodies stain like spirochætes, their colour showing up as a fine ruby red; the bacteria stained very much more intensely, and frequently stained deep blue. The author considers the organisms to be of the nature of bacteria. With regard to their size, measurements showed the smaller forms to be about 0·3 micron to 0·4 micron. A series of experiments regarding the filterability of such organisms were performed, and gave negative results. All attempts at culture on numerous media failed. In the present paper the author discusses the frequency of the occurrence of these organisms in lice, and he considers the majority of lice obtained from prison camps to be infected. The experimental transmission of typhus to monkeys by means of lice gave very unsatisfactory results. Guinea-pigs, however, proved much better, eight out of ten attempts being successful. The amount of material inoculated by the bite of the louse was shown to be exceedingly minute, a female louse apparently ingesting only some 0·00089 grm. of blood. In order to produce typhus experimentally in the guinea-pig, 3 c.c. to 4 c.c. of blood are necessary, and the author therefore considers that the louse does not convey typhus mechanically, but that the organisms multiply actively in the louse. By the examination of numbers of sections of typhus lice, and comparison with normal lice, it was determined that the small bacillus-like bodies were present in great masses in the stomach cells, and also in the salivary glands. The author considers that the bodies described are really the cause of typhus, because he can transmit the disease with them. (Notes by A. H. Drew in *Journ. of State Medicine*.)

Suture of the Suprapubic Wound after Prostatectomy (V. Pauchet, *Presse Médicale*, December 27).—By this technic complete healing within twenty days can almost be guaranteed. A Marion drain is left in the wound for nine days. Then a retention catheter diverts the urine through the urethra for three days. Then the wound is sutured, and the retention catheter introduced again and left for eight days. The twenty-first day this catheter is removed and also the suture threads. He takes two U catgut sutures in the bladder wall, enclosing both lips of the wound but not entering the mucous membrane lining of the bladder. After these are drawn tight and tied separately, he passes three silkworm gut sutures. The needle enters the rectus muscle, skips twice through the outer layer of the bladder wall, and then passes through the rectus muscle on the other side. Then each end of the silkworm gut is crossed back and brought out through the skin on the side of the incision where it first entered. One such suture is taken directly across the suture in the bladder wall, and the two others just above and below this. The skin is coaptated with clips and a roll of gauze is laid over this. Then the ends of the three figure 8 sutures are tied tight separately over the gauze.

The various steps of the suture are illustrated. The urine clears up spontaneously afterward or after irrigating a few times with a silver salt. If there is a divertieulum in the bladder there may be slight pyuria for some time. Removal of the hypertrophied prostate is often surprisingly simple and easy, but sometimes it is difficult to locate the exact plane of cleavage on account of multiple adenomas, or inflammation in and around the prostate. Considerable skill is necessary in such cases to clear out all the débris of the prostate and leave a cavity smooth to the touch. Unless this is done, healing may be delayed. It is difficult to carry through a long series of prostatectomies without such mishaps occasionally. Of 477 prostatectomies no death occurred in the last series of forty. Almost the only contra-indications are the clearly insufficient heart (shortness of breath, œdema) or much altered kidneys. When there is the least doubt as to the resisting powers, the functional capacity of the kidneys or the asepsis of the urine, the operation is done at two sittings, and the prognosis has been singularly improved since doing this. Between the two steps of the operation the patient leads his usual life, goes out of doors, but restricts his diet to fruits, vegetables, rice, potatoes and butter, avoiding nitrogenous foods as much as possible. After he has been at home for a few weeks or months, and the surgeon estimates that he has regained sufficient resisting powers, then the date of the secondary prostatectomy can be fixed.

Original Communications.

ENTEROMONAS HOMINIS AND *PROTEROMITUS TESTUDINIS*.

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CONTENTS.—*Introductory*—*Enteromonas Infections*—*Tortoise Parasite*—*Classification*—*Tetramitidæ Subfamilies*—*Phylogenetic Relations*—*Summary*—*References*—*Illustrations.*

Introductory.—We have already published a paper dealing with *Chilomastix mesnili* (Wenyon 1910) and two detailing infections with *Enteromonas hominis* da Fonseca 1915, and we continue this study of the genera of the *Tetramitidæ* by recording a fourth and fifth human infections with *Enteromonas hominis* and our attempts to find this parasite in some animal other than man.

In our researches to discover this species in the animals met with around Khartoum and Omdurman we chanced upon a flagellate in the large intestine of *Testudo calcarata* (a rather rare form of tortoise here), which at first sight resembled *Enteromonas*. Further study, however, revealed that it was a species new to science and that it could not be classified in the known genera of the Tetramitidæ.

We have therefore been compelled to form a new genus for this parasite, and in so doing have come to the conclusion that the subfamilies of the Tetramitidæ should number three and not two, as previously stated by us.

We therefore add a third subfamily "*Embadamonadinæ*" to the Trichomonadinæ and Tetramitidinæ already defined by us.

Enteromonas Infections.—Recently El Lewa Mousally Pasha sent us for examination the fæces of a Sudanese soldier suffering from diarrhœa in Omdurman.

There were a small number of *Enteromonas hominis* (fig. 1) to be seen, and a form of Trichomonas which we know well and which we do not consider to be pathogenic.

Under the circumstances we thought that probably the diarrhœa was caused by Enteromonas, and treated the patient in exactly the same way as the British officer already reported. The result was satisfactory.

More recently Dr. Iskander Sarkis sent us a case from the Central Prison in Khartoum North, but this was a mixed infection with amœbæ.

This makes the fifth known infection of man with this parasite. The five infections are:—

(1) Woman in Brazil in 1915.
(2) Woman in Khartoum in 1917.
(3) British officer in Omdurman in 1917.
(4) Sudanese soldier in Omdurman in 1918.
(5) Male Sudanese convict in the Central Prison at Khartoum North in 1918.

We have nothing to add to our previous descriptions of the disease and its treatment or the parasite, and therefore we pass on to the new flagellate.

Tortoise Parasite.—When examining the contents of the large intestine of *Testudo calcarata*, from the neighbourhood of Omdurman, in our search for a possible animal host of *Enteromonas hominis* we observed a rapidly rotating flagellate which looked very like a large form of Enteromonas.

Films from the fæces were made, and the parasites were killed by osmic acid vapour, fixed in Schaudinn's fluid and stained by iron hæmotoxylin.

When these films were examined a number of flagellates were seen having the structure depicted in fig. 2.

The parasite is generally more or less rounded (figs. 4 and 5), but its shape depends upon many factors, as its periplast appears to be thin and flexible.

When not distorted, i.e., in its rounded condition, its greatest diameter varies from 6 to 11 microns, while its cytoplasm is much vacuolated.

Anteriorly it possesses a blepharoplast complex, which is probably composed of more than one blepharoplast, but we are uncertain as to the exact number, and therefore prefer to consider it as a complex.

This complex gives rise to four unequal anteriorly-directed flagella (figs. 2 and 3), while posteriorly (fig. 3) it is connected with the nucleus by means of a rhizoplast, just as in Enteromonas.

The nucleus is a protokaryon, being oval in shape and having a siderophilous margin and very distinct karyosome in well-decolorized specimens (fig. 2). It is situate in the anterior third of the body some little distance posterior to the blepharoplast complex, to which, as already stated, it is connected by a well-defined siderophilous rhizoplast (fig. 5).

We have been unable to find a cytostome, an axostyle, a posterior or trailing flagellum or an undulating membrane, nor have we noted any division forms or cysts.

We now turn to consider the systemic position of this flagellate.

Classification.—As the flagellate we are considering has a thin periplast, it belongs to Cohn's subclass *Euflagellata* of the Mastigophora.

As it possesses no chromatophores and is not amœboid, while its flagella assist in the capture of its food, it is a member of Blochmann's order *Protomonadina*.

As there is no tendency to bilateral symmetry, it may be placed in Hartmann and Chagas's suborder *Monozoa*.

The presence of the four anteriorly-directed flagella classifies it in Saville Kent's family *Tetramitidæ*, and therefore we pass on to consider the possible subfamilies of this family.

Tetramitidæ Subfamilies.—In our paper on "*Chilomastix mesnili*" we divided the family Tetramitidæ into two subfamilies, viz., the *Trichomonodinæ* and the *Tetramitidinæ*.

The last named included all genera of the family without an axostyle.

When, however, we began to study Enteromonas.

and more particularly after the study of the present parasite, we were impressed with the importance of the number of flagella as a point for classification.

When it is considered that these organellæ are used not merely for motion, but also for the purpose of obtaining food for the organism, it must be conceded that their number and arrangement must be of vital importance to the flagellate.

We therefore consider that those genera of the Tetramitidæ which do not possess an axostyle may, with advantage, be subdivided into two subfamilies in one of which three flagella are the outstanding feature, while in the other four or more is the predominant character.

The subfamilies of the *Tetramitidæ* may therefore be differentiated as follows:—

A. Without an axostyle:—

a. With three flagella ...	Subfamily I	*Embadomonadinæ* Chalmers and Pekkola 1918
b. With four flagella ...	Subfamily II	*Tetramitidinæ* Chalmers and Pekkola 1917 emendavit 1918
B. With an axostyle	Subfamily III	*Trichomonadinæ* Chalmers and Pekkola 1917

The known genera of the subfamily *Embadomonadinæ* may be recognized as follows:—

A. Without cytostome:—

a. With three anterior flagella — 1. *Enteromonas* da Fonseca 1915

b. With one anterior and two posterior flagella ... — 2. *Dallengeria* Saville Kent 1880

B. Cytostome present or probably present:—

a. With one anterior, one cytostomic and then free, and one free trailing flagellum .. ... — 3. *Trimastix* Saville Kent 1880

b. With one anterior and one posterior flagellum which is generally cytostomic and with a large cytostome with siderophilous, often folded, border ... ... — 4. *Embadomonas* Mackinnon 1911

The known species of these genera are:—

(1) *Enteromonas hominis* da Fonseca 1915.
(2) *Dallengeria drysdali* Saville Kent 1880.
(3) *Trimastix marina* Saville Kent 1880.
(4) *Embadomonas agilis* Mackinnon 1911.
(5) *Embadomonas alexeieffi* Mackinnon 1912.
(6) *Embadomonas intestinalis* (Wenyon and O'Connor 1917).

The differentiation of the Embadomonas species may be effected as follows:—

A. Habitat intestine of Trichopterous and Tipula Larvæ in British Isles:—

a. Cytostomic borders feebly siderophilous, cytostomic flagellum exceedingly delicate and inconspicuous ... — 1. *Agilis*
Size: 4·11 × 1·5-3 microns
Cysts: about 4 × 3 microns

b. Cytostomic borders markedly siderophilous, cytostomic flagellum well developed ... ... — 2. *Alexeieffi*
Size: 7·16 × 5·9 microns
Cysts: 5·6 × 4·5 microns

B. Habitat intestine of Man in Alexandria:—

Anterior flagellum long and thin, cytostomic flagellum shorter and stouter ... ... — 3. *Intestinalis*
Size: 4·9 microns long, but with variable 2-4 microns in narrow forms
Cysts: 4·5-6 microns in length.

It is obvious that the parasite which we are considering does not belong to any of the above species, while its four anterior flagella place it in the subfamily Tetramitidinæ, which contains the following genera:—

(1) Tetramitus Perty 1852.
(2) Callodictyon Carter 1865.
(3) Costiopsis Senn 1900.
(4) Chilomastix Alexeieff 1911.
(5) Tetrachilomastix da Fonseca 1915.

But the parasite we are considering does not belong to any of these genera.

It is not Callodictyon, even if Blochmann is correct that this genus has four anterior flagella, because it is parasitic and because it has no deep ventral longitudinal furrow, while the absence of a cytostome differentiates it from the remaining four genera.

It is therefore a new genus, and for it we propose the name *Protetramitus* Chalmers and Pekkola 1918.

As we found our flagellate in the large intestine of *Testudo calcarata*, obtained near the town of Omdurman in the Anglo-Egyptian Sudan, we name it *Protetramitus testudinis*.

We have looked through such literature as we have here to see whether any other parasite might possibly belong to the genus Protetramitus, and we observe that Dobell, on page 242 of volume 53 of the *Quarterly Journal of Microscopical Science*, describes a flagellate which he names *Monocercomonas bufonis* Dobell 1909. This parasite showed itself in two forms, one small and slender, and another larger and broader. It possessed four equal anterior flagella, which sometimes appear to arise directly from the nucleus (rhizoplast?) and sometimes from a small blepharoplast lying anterior to and independent from the nucleus, which is a large oval body composed of loosely packed chromatin granules and which is also situate anteriorly. There was no cytostome and no axostyle.

He hesitates considerably before placing it in the genus Monocercomonas, which he says is "*not very well defined*," and if it had been free living he would have classified it as Tetramitus.

One cannot but admit that in 1909 Dobell was justified in placing this parasite in the genus Monocercomonas, but, thanks to the labours of Mackinnon, we know that Monocercomonas should

have an axostyle, which, as she points out, Dobell's flagellate does not possess.

It resembles in many respects our genus Protetramitus, but Dobell does not mention a rhizoplast, though he does say that the flagella may arise directly from the nucleus. The periplast also appears to be different.

These differences, however, seem to us to be more of specific than of generic value, and we would therefore classify Dobell's parasite in our new genus and distinguish it from our species as follows:—

A.	Poorly defined periplast, flagella not equal, shape rounded ... Size 6-11 microns in diameter	Species 1. *Protetramitus testudinis* Chalmers and Pekkola 1918
B.	Well defined periplast, equal flagella, shape fusiform ... Size 10-20 × 2-7 microns	Species 2. *Protetramitus bufonis* (Dobell 1909)

We are now in a position to offer a definition of the genus Protetramitus as follows:—

Parasitic Tetramitidæ without axostyle, with four anterior flagella, without cytostome or deep ventral longitudinal furrow. *Type Species.—Protetramitus testudinis* Chalmers and Pekkola 1918 found in small numbers in the large intestine of *Testudo calcarata* obtained near Omdurman.

It is now necessary to differentiate our new genus from the other genera of the subfamily Tetramitidinæ, and this may be effected as follows:—

A.	*Without cytostome*	1. *Protetramitus* Chalmers and Pekkola 1918
B.	*Cytostome probably present*:— At all events there is a deep ventral longitudinal furrow	2. *Callodictyon* Carter 1865
C.	*Cytostome present*:—	
	I. Trailing flagellum is free:—	
	a. Body dorso-ventrally compressed, ventral surface with deep depression which serves as a sucker and contains the cytostome and two short free flagella; the two thick long trailing flagella issue from this depression ...	3. *Costiopsis* Senn 1900
	b. Body more or less symmetrical and not compressed or arranged as above, with three anterior and one free trailing flagellum ...	4. *Tetramitus* Perty 1852
	II. Free trailing flagellum absent:—	
	a. Three anterior flagella	5. *Chilomastix* Alexeieff 1911
	b. Four anterior	6. *Tetrachilomastix* da Fonseca 1915

The known species of these genera are:—

(1) *Protetramitus testudinis* Chalmers and Pekkola 1918.

(2) *Protetramitus bufonis* (Dobell 1909).

(3) *Callodictyon triciliatum* Carter 1865, synonym *Tetramitus sulcatus* Stein 1878.

(4) *Tetramitus descissus* Perty 1852.

(5) *Tetramitus rostratus* Perty 1852.

(6) *Tetramitus pyriformis* Klebs 1892.

(7) *Costiopsis necatrix* (Henneguy 1884).

(8) *Chilomastix caulleryi* (Alexeieff 1909).

(9) *Chilomastix mesnili* (Wenyon 1910).

(10) *Chilomastix bittencourti* da Fonseca 1915.

(11) *Chilomastix capræ* da Fonseca 1915.

(12) *Chilomastix cuniculi* da Fonseca 1915.

(13) *Chilomastix motelli*x Alexeieff 1912.

(14) *Tetrachilomastix gallinarum* (Martin and Robertson 1912).

We have already indicated in our paper on Chilomastix a method of differentiating the various species of that genus, and we now give a table for purpose of recognizing the species of Tetramitus which can be effected by the characters given by Klebs in 1892:—

A.	Body narrow egg-form, posterior end drawn out into a point, anterior end truncated ... Size: 13-28 × 7-15 microns.	1. *Descissus*
B.	Body approximately narrow egg-form, anteriorly truncated and on one side prolonged into a rostrum, posterior end thinned Size: 18-30 × 8-11 microns.	2. *Rostratus*
C.	Body broad egg-form, anteriorly convex, and rounded, posteriorly drawn out into a point Size: 11-13 × 10-12 microns.	3. *Pyriformis*

Phylogenetic Relations.—The possible phylogenetic relationships of the various genera mentioned may be gathered at a glance from the diagram given below.

It will be seen that we have depicted two possible lines of evolution for those genera of the Tetramitidæ which do not possess an axostyle, viz., a line for those having in all three flagella and ending in the genus Embadomonas, as we consider it probable that the siderophilous lips of its cytostome indicate that, like Chilomastix, there may be a hidden flagellum, morphologically a posteriorly directed flagellum. With reference to this, please see our paper dealing with *Chilomastix mesnili*.

The other line is that of the genera possessing four flagella ending in Chilomastix from which springs a new or five flagellate branch on which we, at present, know only the genus Tetrachilomastix.

It is obvious that genera like Dallengeria, Trimastix, and Costiopsis require re-examination by modern methods, unless indeed this has been done without our knowledge owing to the limited literature available in Khartoum.

It will be observed from the diagram that the genera appear to fall naturally into the three subfamilies which we propose.

Summary.—We here record the fourth and fifth infections in man by *Enteromonas hominis*, and we mention our failure to discover this parasite in animals about Khartoum and Omdurman, while we

draw attention to a new genus and species of flagellate *Protetramitus testudinis*, which has helped us to understand, we believe in a better manner, the relationships of the genera of the Tetramitidæ.

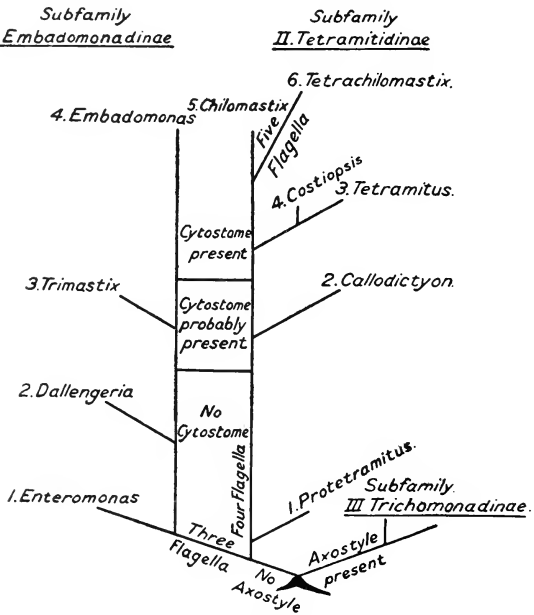
Profiting by this new information we have divided the family into three subfamilies, and with our Chilomastix paper we have now given tables to differentiate the different genera of the family and also other tables for the species of the genera included in the subfamilies *Embadomonidinæ* and *Tetramitidinæ*. Finally we may state that in looking through such literature as is at our disposal here, we have only once met with an illustration which might be allied to Enteromonas.

In Volume 53 of the *Quarterly Journal of Microscopical Science*, in Plate 3, Figure 48, of his valuable paper on the Intestinal Protozoa of Frogs and Toads, Dobell figures an oval flagellate of apparently simple structure and with three anterior flagella, but seems only to have seen this parasite once in the fæces of Bufo, and apparently only to have observed it alive, and not to have studied it by histological methods. He merely states that its length was about 6 microns, and that its movements were sluggish, and that the three flagella were separated at their origin, which rather excludes the possibility of its being an Enteromonas, still we invite attention to this observation for the benefit of other workers, as it may have possibilities.

Khartoum,
April 27, 1918.

PLATE II.

DIAGRAM OF POSSIBLE AFFINITIES OF THE GENERA ENTEROMONAS AND PROTETRAMITUS.



Ancestor with anterior flagella. No axostyle, no cytostome, no posterior flagellum.

REFERENCES.

CHALMERS and PEKKOLA (1908). *Annals of Tropical Medicine and Parasitology*, vol. xi, No. 3, pp. 233-251 (Genera of the Tetramitidæ), pp. 251-253 and p. 259 (Subfamilies). Liverpool.

CHALMERS and PEKKOLA (1917). *Proceedings of the Society*

PLATE I.

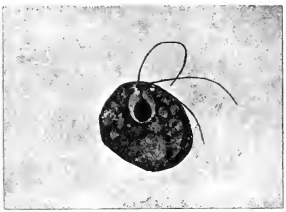


Fig. 1.

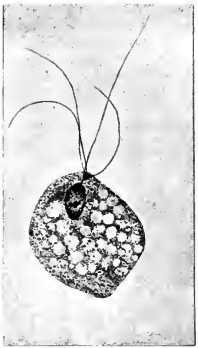


Fig. 2.

Fig. 3.

Fig. 4.

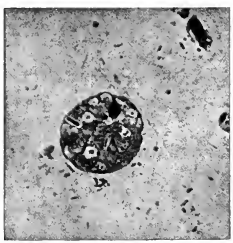


Fig. 5.

To illustrate paper, "*Enteromonas hominis* and *Protetramitus testudinis*" by ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H., and WÄINO PEKKOLA.

of Tropical Medicine and Hygiene, December (*Enteromonas hominis* in the Sudan). London.

CHALMERS and PEKKOLA (1917). *Bulletin de la Société de Pathologie Exotique*, vol. x, No. 8 (*Enteromonas hominis* in a British officer). Paris.

DOBELL (1909). *Quarterly Journal of Microscopical Science*, vol. liii, p. 242 (*Monocercomonas bufonis*), pp. 244-245 (a triflagellate monad). London.

MACKINNON (1912-13). "Parasitology," vol. v, p. 179 (Monocercomonas), p. 180, foot-note (*M. bufonis* Dobell 1909). Cambridge.

MACKINNON (1916). *Quarterly Journal of Microscopical Science*, vol. lxi, pp. 106-108 (Definitions of the genus Embadomonas and of the species *E. agilis* and *E. alexeieffi*). London.

WENYON and O'CONNOR (1917). "Human Intestinal Protozoa in the Near East," pp. 86-89 (*Waskia intestinalis*). Wellcome Bureau of Scientific Research. London.

ILLUSTRATIONS.

PLATE I.

FIG. 1.—Drawing to show the structure of *Enteromonas hominis*. Zeiss Apochromatic 1·5, Compensating Ocular 12.

FIG. 2.—Drawing to show the structure of *Protetramitus testudinis*. Zeiss Apochromatic 1·5, Compensating Ocular 12. Note central chromatic particle and false or chromatinic membrane formed by chromatin granules.

FIG. 3.—*Protetramitus testudinis* to show flagella. × 2,000 diameters. Photomicrograph.

FIG. 4.—*Protetramitus testudinis* to show rhizoplast. × 1,000 diameters. Photomicrograph.

FIG. 5.—*Protetramitus testudinis* to show nucleus and rhizoplast. × 1,000 diameters. Photomicrograph.

PLATE II.

Diagram of possible affinities of the genera *Enteromonas* and *Protetramitus*.

Dwarf Tapeworm in Argentina (S. E. Parodi, *Prensa Medica*, January 10).—*Hymenolepis nana* were found in 8 per cent. of the children's stools examined at Buenos Aires and in 0·66 per cent. of adults' stools. As these dwarf tapeworms infest the lower intestine they cause comparatively little disturbance. In a few of the children there were gastro-intestinal symptoms and two presented nervous phenomena resembling epilepsy. One girl of 14 had these epileptiform attacks every week for two for four years. Twitching of the head or left arm was the first symptom, and then came loss of consciousness for a few minutes. Once the convulsion lasted for half an hour, the tongue was bitten, and the child was unconscious for several hours. Tonics and sedatives had been ordered by various clinicians, but one noticed finally that the child's nose seemed to itch a great deal, and examination of the stools then revealed the ova, and under thorough and repeated male fern or thymol treatment hundreds of helminths were passed, and there have been no nervous symptoms since. In another case a boy of 13, apparently healthy otherwise, had fallen unconscious for three or four minutes, the eyeballs rolling up. These attacks were repeated four or five times a day, and there were frequent headaches. After six months of this the stools were examined, and the dwarf tapeworm ova and endamœba cysts were found in large numbers.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JULY 1, 1918.

REPLENISHING THE POPULATION AFTER THE WAR.

AT the present time, when the male population is being swept away on the battlefield or from sickness contracted in the war areas, it is interesting to review the subject of peopling the nations from various points of view.

The writer has had a fairly extended opportunity

of gathering particulars in regard to the birth-rate existing in families from amongst men called up for military service between the ages of 40 and 51. Being struck by the number of men who stated they had no children, the writer took notes of the number of the children born to men up to the ages of 51, and the result is not pleasant reading nor satisfactory from the population point of view.

The men varied in occupation, from carmen, tailors, workers in various factories, to men in high commercial and legal positions, so that practically all classes were represented. There is a belief abroad that it is only in the case of those in better social positions that limitations of families prevailed, but the writer's observations do not uphold this contention, rather to his surprise.

The men who were examined were some not yet called up for service, but the majority were men who had been graded by the medical authorities and passed in a higher grade than they thought they were fit for. The first group consisted of twenty men who had been married from six to twenty-two years; the number of children amounted to fifteen, that is to say to forty parents (twenty men and twenty women) fifteen children only were born—a birth-rate which, if continued, would in a couple of generations practically reduce the population by more than 50 per cent. The marriage gave barren returns in twenty-five returns, and of the remainder 75 per cent. one child only was the rule.

Of a second batch of six men, three had no children and three had five (one family had three children, and two one each), that is to say, of twelve parents the decline in population was more than 50 per cent. In none of the families was the mother older than the husband, therefore all the women were within the child-bearing period. The examples might be multiplied, but the proportions in all groups came out about the same. The " no family " fashion seems to have been the rule in the majority of families, and in those to whom children were born the majority had one child only. The usual tale was that he did not see his way to maintain a child, and in others that his wife had a bad time and refused to have any more, or that he, having regard to his wife's suffering, prevented her having any more.

If anything could mark degeneration these observations surely do. The marriage vows taken by these people included, with the opening remarks, that marriage was instituted for the procreation of children; but they, in the majority of instances, broke their marriage vows and lived a life of selfish sexuality only. The effect on a man and woman living in such immoral conditions is known to everyone. The wife breaks away from the husband or vice versa, or the wife develops uterine troubles, fibroids especially, for the uterus, as has been remarked, " will grow something " if the normal product of the womb is disallowed it. How many times again does it happen that when first married the couple agree that there shall be no children until they can afford it, and when that day arrives and a child is wished for that no child is forthcoming; but instead the wife develops a tumour which requires to be surgically dealt with, and the woman finds herself minus uterus it may be, or ovaries, long before the possible child-bearing period is approached?

If this condition of things belongs to the higher civilization and if it is continued, then it will not be long before the higher civilization is wiped out by people who continue to live natural lives and to whom children are born, as Nature meant them to be. How many records of the deaths of only sons do we read of as having occurred at the Front? and while pity is forthcoming in plenty, the pity is deepened by the fact that the misled or selfish parents have only themselves to blame for the one son, and in many instances the only child, of the family. The mills of God grind slowly, but the day of retribution comes to all who have sinfully limited their families to a minimum or defied Nature's laws by corrupt practices. No doubt the absence of children is due in many instances to ailments in the man or woman before marriage, and yet these are usually the effects on the general health of that form of civilization termed higher, but is in fact a low form of civilization, which leads to a mode of living degenerate in type and fruitful of the consequences of disobeying Nature and all her laws.

It is sometimes the man, sometimes the woman, to whom the sterility is due. The man having had double orchitis, the result of gonorrhœa, is wellnigh invariably sterile. An interesting point in connection with double orchitis due to mumps is that it does not render the man sterile in consequence, a fact which should give comfort to parents should such a condition befall their son. It is a moot point whether the girl who suffers from mumps ever gets ovaritis, but it seems highly probable and may account for ovarian troubles in women, situated as the ovary is with a surrounding of an intimate character. The other causes of impotency in the male are syphilis and tubercular diseases of testicle, &c., but the chief cause of the " no family " legend is voluntary prevention with all its miserable and discreditable effects on the moral character of the men and women who follow its degrading teaching. What is to become of the population of Europe when some 20,000,000 of the men are destroyed and a potentiality of double that number being added to that total before the War ends?

Will the couples marrying now improve matters and cease the limitation-of-family fashion, which has beset mankind for the past thirty years with its degrading influence? Are the young women of to-day likely to listen to reason and to Nature in the matter of being willing to increase the population? Is the training of the young girls of to-day calculated to produce healthy-minded women? The general consensus is against her being so minded, and the outlook is filled with something akin to dred for the future of the race. Truculent, self-willed, uncontrolled and defiant, without reverence for seniors or parents, is she likely to prove a productive mother and to be bothered with the trammels of a large family? Unless legislation inter-

venes the marriage relations will go from bad to worse. It is long ago since the writer on "Physical Efficiency" stated legislation ought to be introduced so "that a man or woman may respectively be entitled to a divorce should the 'no family creed' be proved against either."

Infant mortality is held to be a great factor in the dwindling number of our population, but the "no family creed" is a greater evil in producing moral and religious deterioration and of sapping the home life of our people.

Of foreigners called up for military duties in London the tale is a very different one. The Germans, the Poles, the Russians, examined by the writer were for the most part Jews, and with them there is no evidence of limitation of families. The fertility and the virility of the Jew remains. Their religion has not lost its power, and its commands are obeyed in a manner which should serve as an example for their Christian neighbours to follow. With them the Fifth Commandment holds good; they do honour their father and mother, and follow the teaching of, and have to obey the commands of their parents; they look upon children as a gift from God, and not as a nuisance, as do "advanced" people in Western Europe. They thrive in every land, because they follow the Divine teaching of a primitive people for whom to multiply and replenish the earth is a creed. That we require to replenish the earth was never more apparent than now. We do not know how many people were destroyed by the Flood, but it is doubtful if their numbers exceeded the number being destroyed by the four years of constant fighting in which almost all the nations of the earth are engaged.

The Germans, it is said, have seriously discussed the question of polygamy as a means of obtaining a sufficiency of males to husband the women. Could they "command" that the majority of all children born for the next ten years were to be male children, good and well; but this is, so far, an impossibility to accomplish. And what about the bachelors? Between 40 and 51 they amounted to over one-quarter of the married men who came under the writer's observation. These derelicts of their race are content to see life out at clubs and restaurants with their usual accompaniments, fulfilling none of the purposes they were brought into the world for, namely, the continuance of their species. They have their reward, but it is often paid in an unpleasant manner, and their latter days of life are not enviable.

A war-wedding fashion has raged ever since the War's commencement. The man on leave finds a girl who "seems to understand" him, and the friends are bidden in haste to the wedding. What about the progeny? A "war baby" is a rarity, for but few of the war-wedded couples have children. "Just as well," say those of parental age, for they have nothing but his pay as temporary captain or lieutenant to live upon. And so the natural result of marriage is annulled; its sanctity dragged in the dust to convenience's bidding. It were better that the two had hanged a millstone around their necks in practice as they have done in theory, for their "no-family creed" is a pollution of soul and body.

The Germans, with their philosophy, their so-called scientific materialism, and their absence of a spiritual religion, in other words, their "Kultur," discuss and regard such matters in a manner that is revolting to most British folk; and have insidiously taught their doctrines in England, and corrupted the minds of spinsters in charge of our schools for girls, until such schools in many instances turn out nothing but "flappers," who are well grounded in sex problems if in nothing else. Many advocate that girls should be taught "these things," thereby polluting their own and their pupils' minds for life. The natural functions of the body require no promptings, no teachings. Nature arranges that throughout all animal life; interference is unnecessary and productive of a "Kultur" which is attractive to many minds, but which bears in its train the trail of the serpent.

"Is civilization played out?" we may well ask ourselves. In certain sections of our race it has wrought evil, and it behoves our clergymen, our schoolmasters and, more important still, our schoolmistresses, to stem the evil spreading to the majority of the community. Most of all is it the parents' duty to see to it. But the authority of the parent is hampered at the present day. The Church must see to it that the young are trained in real religion; the school teachers must not be allowed to usurp the parents' power and influence.

Annotations.

Nature of Rabies Virus (P. Remlinger, *Bulletin de l'Académie de Médecine*, February 12, 1918).—The diffusibility of rabies is a special property which distinguishes it from protozoa and bacteria, and brings it closer to chemicals. For instance, if tissues containing the bacilli of anthrax, tuberculosis, or glanders are immersed in glycerine, they do not diffuse through the glycerine, and the latter can be injected into susceptible animals without inducing infection. But if any tissue from an animal with rabies is placed in glycerine, the glycerine and even scraps of normal tissue that have been immersed in it, likewise, promptly induce rabies in animals inoculated with the glycerine or the scraps of tissue in it. This extreme diffusibility is like that of chemical substances.

The rabies virus differs, however, from chemical substances in that it passes through the more porous filters, but not the others. With a less porous filter the virus may induce rabies in the animal inoculated, but it is impossible to reproduce the disease from this animal in others. With a still finer filter the virus induces merely cachexia without actual rabies. Chemical substances in solution, on the other hand, pass through the filters regardless of the porosity. The rabies virus, therefore, in regard to the filters, behaves differently from both bacteria and chemicals.

The rabies virus behaves paradoxically also in centrifugation. This has no effect on a chemical solution, but it does have a very slight effect on rabies virus; the virus very slowly leaves the upper layers of the fluid. In short, the rabies virus, filterable and diffusible, seems to offer a connecting link between the visible microbes, which represent the lower limit of the vegetable kingdom, and the diastases, that is, the colloidal substances which may be regarded as at the highest limit of the inorganic bodies. It is thus a transitional form between the visible microbes and the colloids.

Protracted Parameningococcus Septicæmia (Tardy Meningitis) (H. Aimé and H. Chéné, *Paris Médical*, February 9).—Early lumbar puncture in dubious cases is important without waiting for actual meningitis to develop. This gave the clue, and permitted effectual treatment in a case described which otherwise would not have been cleared up in time. The main symptoms were those of a septicæmia dragging along for a month with intermittent attacks simulating those of malaria. Finally symptoms suggesting menigitis developed, and a few diplococci were found. Diplococcus septicæmia is rare; only twelve cases have been published to date, they say, including Marie's three. Under serotherapy the man was discharged cured nearly four months after the first symptoms had attracted attention; fever, pains in the legs, headache, and a transient papulous eruption. The attacks with chill, high fever, eruption, and pains in the joint returned irregularly. Nine intraspinal injections of antiserum were made in the course of three weeks, and the antiserum was injected subcutaneously a few times.

Cause and Prevention of Goitre (H. Hunziker, *Correspondenzblatt für Schweizer Aerzte*, February 9).—Prevalence of goitre in different regions and altitudes in Switzerland is due to functional hypertrophy of the thyroid caused by the effort of the organism to make up a deficit in the iodine supply. As the iodine naturally is supplied in the food, goitre is prevalent in regions where the vegetation lacks the standard proportion of iodine. Iodine-containing manure in the regions where goitre is endemic might supply the vegetables with the needed iodine, and thus exterminate goitre. The main goitre regions are at a moderate altitude, from 600 to 1,000 metres; above and below this, goitre is less prevalent. In one comparatively exempt canton the cooking salt used had an unusually high iodine content. In certain years goitres develop more numerously than in others. This may be due to rains which wash the salts out of the soil. A sandy soil yields them up more readily to the rains. In a rainy season, also, the vegetation grows less luxuriant and takes up less of the salts in the soil. At altitudes above 1,000 metres the vegetation grows so luxuriantly when it gets a chance to grow that it works deep into the soil and takes up the salts. It is significant further that the comparatively exempt cantons have their main rainfall in the autumn, instead of in the spring as elsewhere. In short, goitre is due to an iodine-poor diet. The iodine-poor vegetables connect goitre with climate and geological formations. The simplest way to remedy the poverty in iodine would be to have salt made with a small admixture of iodine. The iodine in salt in bread may not be volatilized by the heat of the baking. A year of such "fertilizing" of human beings on a large scale by adding iodine to the salt would go far toward solving the problem. A still simpler plan would be to have the salt taken from the salt springs in a comparatively exempt canton sent to a canton where goitre is very prevalent, exchanging it for salt made from the iodine-poor salt springs in the latter canton. All the testimony and arguments presented emphasize the importance of ensuring an ampler iodine intake in regions where goitre is prevalent.

Echinococcus Cysts in the Lungs (A. Corvetto, *Cronica Medica*, Lima, January, 1918).—At necropsies of persons with pulmonary tuberculosis, in three cases a primary echinococcus cyst was found in the lung, the spleen, or the liver, which had escaped detection during life. One case of primary echinococcus disease of the lung was diagnosed during life. The symptoms suggested incipient pulmonary tuberculosis, with recurring slight hæmoptysis and cough, the sputum scanty and mucous. After four months of this the man felt sudden suffocation and coughed up the membrane of a hydatid cyst about the size of an egg. All the symptoms permanently subsided. In a fatal case of pulmonary tuberculosis two echinococcus cysts in one lung found at necropsy had caused no reaction on the part of the parenchyma, and had escaped detection during life.

Meningeal Form of Suprarenal Insufficiency (A. S. Moreno, *Cronica Medica*, Lima, January, 1918).—A girl of 7 had severe febrile and toxic gastro-intestinal disturbance, and meningeal symptoms, unequal pupils, Kernig's sign, vomiting, cephalalgia, &c., with tachycardia, low blood pressure, uncontrollable vomiting, white dermographism and extreme prostration. Accepting this set of symptoms as the pseudo-meningeal form of suprarenal insufficiency, a subcutaneous injection of 1 mg. of suprarenal extract was given. There was no change the next day in the apparently moribund child, but the injection was repeated morning and evening, and the following day marked improvement was evident, and the child was soon fully convalescent. The suprarenals probably were not strong, and the toxic action from the poisonous products generated during the severe digestive upset had evidently induced acute insufficiency on the part of the glands.

Abstracts.

A CASE OF AMŒBIC ABSCESS OF THE LIVER AND BRAIN WITH NO PREVIOUS HISTORY OF DYSENTERY.[1]

By T. D. M. Stout and D. E. Fenwick.

The chief points of interest in the following case are the absence of a history of any previous illness of a dysenteric nature and the difficulty of ascertaining the occasion of the primary infection. One can only surmise that the infection occurred from contact with a carrier. In the *Presse Médicale* of August 6 MM. A. Fuchs and A. Bouchet quote four similar cases of amœbic liver abscess, in none of which was there any history of a previous attack of dysentery or even of diarrhœa. These cases all occurred in one limited area, and were considered by the authors of the article to be due to infection from a carrier.

Corporal W. B., aged 35, was admitted on July 11, 1917, from France, diagnosed "gall-stones," with notes to the effect that he had had, since admission to hospital in France, an evening rise of temperature to 103° F., with frequent rigors, jaundice, and pain in the region of the gall-bladder. The following information was gathered as regards the patient's history:—

He had arrived in England towards the end of February, 1917, having during the voyage from New Zealand spent a day ashore at Albany and several days at Cape Town. He had never previously been out of New Zealand. While in camp in England, in April, he had an attack of what he thought was influenza, with pain in his right side, "just under the ribs," and in his right shoulder. He thought he had one or two shivering attacks at this time. He recovered and was sent to France, apparently well, on May 27. From the time he reached France to the date he was admitted to hospital, June 15, he had several attacks of shivering at night, and these rigors continued with greater frequency after he was admitted to hospital. He stated that he had never had an attack of dysentery, had never suffered with diarrhœa, and had never noticed anything abnormal with his motions.

In this hospital the patient had a nightly rise of temperature to 102° to 103° F., with rigors at intervals of two or three days. He complained of pain on the right side on taking a deep breath and of a constant sense of fulness and discomfort on the right side. He was sallow but not definitely jaundiced. On palpation there was marked tenderness in the region of the gall-bladder, and there was also tenderness in the right infra-axillary region. There was slight bulging of the lower ribs on the right side, and in this region there was some œdema of the skin, noted by the difficulty in pinching up the skin as compared with the same area on the opposite side. There was an extension upwards of the liver dulness on the right side, in front, in the axilla, and behind. Breath sounds at the right base were faint, there was diminished vocal resonance, and tactile fremitus was absent. A few crepitations could be heard at both bases. Urine normal. Fæces negative to bacteriological examination. Blood, three days' culture, negative. Blood count showed a leucocytosis of 18,000. No eosinophilia. X-ray examination: Diaphragm was higher on right side, but moved freely with respiration; liver shadow showed indefinite increase of density on right side. The condition was diagnosed as one of hepatic abscess of uncertain nature, and the patient was operated upon.

The abdomen was opened, the liver found to be enlarged, with some weak recent adhesions over the upper part of the right lobe, and in this region the liver felt softer and less resistant than elsewhere. A needle was then inserted between the ninth and tenth ribs in the mid-axillary line towards the portion of the liver where the adhesions were felt, the hand guiding from inside the abdomen. Thick pus was drawn off almost immediately on the needle penetrating the liver. The abdominal incision was then sewn up, and an incision made over the ninth rib in the axillary line. Three inches of rib were removed, the two layers of pleura sewn together over an area of about 2 in. by 1 in, and the incision carried through the layers in the enclosed area, through the diaphragm, and through about ¾ in. of liver substance into the abscess. The abscess filled the greater part of the right lobe, and was about 4 in. in depth, 5 in. from side to side, and 4 in. from above downwards. The contents of the abscess consisted of thick pus, partly brownish red, but mostly light yellow in colour. There were no cysts in, or lining membrane to, the cavity. The pus was evacuated and a large tube inserted for drainage.

Pus obtained at the time of operation was examined bacteriologically with a negative result. Culture were sterile. A specimen of pus from the discharge three days later was found to contain motile *Entamœba histolytica*. The entamœba or cysts have been found in every subsequent examination. There has been no bacterial growth from the pus.

The operation gave immediate relief from the pain and discomfort previously present, but apart from the local improvement and the disappearance of the rigors there has not been a marked change in the patient's condition. The discharge became scanty, and the cavity shrank to about the size of a golf ball. The liver dulness became less than normal.

Emetine hydrochloride was given hypodermically, 1 gr. per diem for fourteen days, with no apparent influence either on the temperature or on the presence of the entamœbæ.

The patient died on September 22. For a fortnight prior to his death he had a temperature of 101° F. with few remissions and no rigors. He had steadily become weaker and very dull mentally, till during the last few days he became almost semi-comatose, with some incontinence of urine and

[1] Abstracted from the *Lancet*, June 1, 1918.

fæces. Otherwise there were no special symptoms observed.

Post-mortem.—The abscess in the liver had shrunk markedly and was no larger than a golf ball, and around the abscess were some scarring and macroscopic degenerative changes. The condition was obviously rapidly recovering. There were adhesions of liver to peritoneum around the sinus, and adhesions of pleura at site of suture. There was no abnormality of intestines, except some slight congestion of the mucous membrane of the cæcum. Some hypostatic pneumonic condition was seen at base of both lungs, especially the right. In the brain an abscess of size of pigeon's egg was present in lower inner portion of right frontal lobe extending into right ventricle and containing thin yellow pus. There was an area of softening in the brain around and localized basal meningitis in that area. The pus contained motile *Entamœba histolytica*. Death was obviously due to the secondary abscess in the brain.

THE ELIMINATION OF QUININE BY THE URINE.[1]

By René Porak.

We have systematically examined for quinine the urine of our patients in the troops in the East for fifteen months. Quinine hydrochlor. and quinine urethane in ampoules were used, the former being given orally in solution. The quinine proportionally estimated by diaphanometry in the urine, to which the liquid of Tanret[2] has been added was identified by the thalleo-quinine reaction.

Two methods of examination were employed: (1) The examination of the urine bi-hourly after one dose of quinine had been administered; (2) the examination for the total amount of quinine passed daily during continuous treatment.

The length of Time for the Elimination of one dose of Quinine.

In a normal subject quinine is eliminated in three stages. In the initial and terminal stages there are only traces of quinine, but in the middle stage, which is of short duration, there is much increased elimination of quinine, generally from the fourth to the tenth hour after absorption.

From these facts it appears that the action of quinine on the hæmatozoon after a single dose is of short duration. The period of elimination is the same whatever the dose, and the method of elimination is the same whatever the mode of administration.

The quinine should be given every two, three, or four hours in 0·25 grm. doses.

Except in certain pathological conditions oral administration is advisable.

The Elimination of Quinine in Different Illnesses.

Diseases of the Digestive Tract.—In alterations of the gastric secretion and peristaltic action anomalies of elimination have not been marked. In certain chronic cases of malaria with severe gastro-intestinal trouble only traces of quinine were found in the urine. In these cases quinine only irritates the gastro-intestinal mucous membrane without touching the parasite.

Diseases of Kidney.—In kidney diseases there are always some anomalies in the elimination of quinine. The elimination is more disordered in severe kidney trouble. In slight kidney disease the elimination of quinine did not cause much trouble. Intravenous injections of quinine sometimes cause a slight, transitory albuminuria, which, however, does not contra-indicate the administration of quinine. If grave nephritis is present, quinine only appears very slowly in the urine, and the third stage of elimination is absent, i.e., elimination stops after the increased stage.

Liver Diseases.—In some cases of malarial hypertrophy of liver the increased elimination of quinine is earlier than in normal subjects as if the retention of quinine in the liver were diminished.

Splenic Diseases.—In leukæmia and splenomedullar leucocythæmia there were no alterations in the elimination.

Heart Diseases.—In cardiac insufficiency, and where there is want of compensation, only small traces of quinine are found in the urine.

In a case of bradycardia and polyuria it was normal.

In three cases of typhoid the elimination was normal.

In old dyspeptic malarial patients the incomplete absorption of quinine should be borne in mind, so that arsenic treatment, which sometimes succeeds in these cases, may be tried.

In conclusion, the period of increased elimination, which is present normally, fails in certain changes in the digestive canal, the kidney, and the organs of circulation. As a rule quinine is well eliminated.

The cycle of elimination is comparable from day to day during continuous treatment; 30 to 40 per cent. of the absorbed quinine is eliminated in the urine.

In addition to the already mentioned digestive, renal, and grave cardiac lesions, we have noticed a marked diminution in the elimination of quinine in certain cases of malaria with anæmia and cachexia. As the patient's condition improves the curve of elimination rises progressively; when it becomes worse it is represented by a descending line. The kidney being slightly affected in malaria, and the quinine rapidly disappearing from the

[1] From *Comptes Rendus des Séances de la Société de Biologie*, vol. lxxii, No. 3, 1918.

[2] "Liquide de Tanret" is a synonym for Meyer's reagent. Tanret's directions are: 13·546 grams of mercuric chloride and 49·8 grams of potassium iodide are dissolved in 1 litre of water. Faintly acid solutions of alkaloids are rendered turbid or precipitated by the reagent. (*Compt. rend.* 86, 1270).

blood, according to our observations, we think that there must be a retention or fixation of the quinine in the organs. This retention appears to cause no inconvenience if not more than 2 grm. is given daily.

Conclusions.

From these observations we consider:—

(1) That the daily amount of quinine administered should be from 1·50 to 2 grm., and that oral administration is best. That the quinine should be given in 0·25 grm. doses in cachet or solution, and that the patient should be encouraged to drink freely after each dose. That the daily 2 grm. should only be exceeded in certain cases of pernicious and primary malaria in the hope of sterilizing the patient according to Abrami. That the quinine treatment should be continued for several consecutive months with more or less frequent intermissions, and that the elimination of the quinine by the urine should be watched.

(2) The indication for the subcutaneous or intramuscular administration of quinine is marked alteration of the digestive tract (chronic malaria with vomiting and diarrhœa).

(3) The intravenous method should only be employed in pernicious cases; then the lavage of the blood-vessels (250 grm. salt solution) plays an important part, and should add to the action of the quinine.

AN OUTBREAK OF PHLEBOTOMUS FEVER.[1]

By J. A. Harley.

In an outbreak of phlebotomus fever in a squadron of yeomanry on outpost duty on the western edge of the cultivation in mid-Egypt in the middle of the summer of 1917, 86·4 per cent. were infected. The first attacked were the men, non-commissioned officers next, and officers last. The first case was discovered on the thirty-seventh day in occupation, and from this there were three or four fresh cases daily for a week, and an average of six daily in the second week. The unit then moved about a mile and a half to a new camp on fresh ground, and, although it was impossible to avoid carrying the infection, better conditions followed. For military reasons it was desirable to maintain occupation of the first position, and after taking preventive measures additional to what had already been followed, a guard drawn from another unit was placed in it. Four days had scarcely elapsed when the non-commissioned officers and men who formed this presented symptoms of infection, and the illness spread through all of them.

The accommodation consisted of a dwelling-house and offices which the officers and non-commissioned officers occupied, and shelters constructed of wood and canvas for the men. All were placed compactly on an elevated site adjacent to a pool which covered about an acre and contained more or less stagnant water. Agricultural drains of muddy water were in touch. The sanitary arrangements were satisfactory except the drinking water, which was bad; the latrines and horse lines were at a reasonable distance. Preventive measures were adopted in the form of cresol spraying throughout, and the use of paraffin oil on breeding places. Everyone, officers and other ranks, had a mosquito net, but this could not be counted on as the midge is so small that it can pass through the mesh. They were plentiful, very small and midge-like, with hairy bodies. They were found on walls and in rubble, but the breeding-places must be moist.

The incubation period was from four to seven days. The onset was very sudden, accompanied with severe malaise, headache, and suffusion about the eyes and post-orbital pain. Pain in the lumbar region was generally intense, and pain and cramp in the limbs occurred. Constipation was nearly always present and profuse sweating. The temperature rose quickly to 102·5° or 103° F., and on a few occasions to 105° F. After twenty-four hours the pyrexia diminished, and at the end of three days fell to normal. The pulse was not correspondingly accelerated—it was seldom above 80; it became soft and weak, and the cardiac condition required attention.

The suddenness of the onset was the marked feature. A man to all appearances in normal health was on duty at 9 a.m., and an hour later reported ill with giddiness and inability to carry on. His temperature was 103° F.; other symptoms developed in the course of an hour or two. One night another was found on horseback wandering up and down the road, unable to recall to mind the way he was accustomed to take to reach camp. He was feeling dazed and ill, and his temperature was 103·2°. An hour earlier, feeling all right, he had left headquarters of the regiment, two miles back.

Phlebotomus fever had not previously been prevalent, nor were contacts from outside found. One or two subjects of malaria were on the strength. From dengue the condition is differentiated by the suffused eyes, absence of rash, and of secondary rise in the temperature after a few days running normal. In paratyphoid the pyrexia seldom runs so high, and has not the characteristic third-day drop to normal. Severity of the rigor and fall of the temperature in a matter of hours distinguish it from malaria; enlargement of the spleen is also to be remembered.

Most cases were evacuated to hospital. Those remaining in the lines were kept together apart from the uninfected; they were given a purgative and sodium salicylate, phenacetin, or opium for the relief of the pyrexia and aching limbs. Subsequent debility was a marked feature considering the shortness of the acute stage, but many managed to recover sufficiently to return to light duty after fourteen days.

[1] Abstracted from *British Medical Journal*, April 6, 1918.

CLINICAL NOTES ON PHLEBOTOMUS FEVER.[1]

By J. A. Delmege and C. S. Staddon.

Phlebotomus fever occurred in Macedonia as an epidemic which attacked certain units camped in the vicinity of some old ruined buildings.

The *Phlebotomus papatasii* fly was very numerous in the tents and dug-outs, and bites were inflicted both by day and night. Exposed parts were most affected—the backs of the hands, the forearms, especially the flexor surfaces, the ankles, and the face. A small irritable papule was produced; in one case the papules were so numerous as to simulate a definite rash.

It was found impossible to make any accurate observations as to the fly's radius of action, but whether by actual flight, or more probably by conveyance on wagons and limbers, it was certainly not less than 300 yards, or more than 500.

The Incubation Period.—This varied from four to six days, and was marked by a feeling of malaise and irritability of temper.

The *onset* was almost invariably sudden, and was usually accompanied by slight shivering; no definite rigors, however, were observed in any case. A slight degree of nasal catarrh, lasting for the first day or two of the fever, occurred in some.

Symptoms.—Severe headache, either frontal or post-orbital, was invariable; abdominal discomfort—not amounting to pain—backache (very marked in some cases), pains in the limbs, and anorexia usually accompanied it.

Signs.—The face was usually uniformly flushed, but though this flush was in no way typical, it did not in any way suggest the dark, flushed, bloated facies of relapsing fever. The conjunctivæ were injected, but the amount of injection varied, being in some cases extremely marked and hardly noticeable in others. It bore no relation to the severity of the infection. The eyeballs were usually tender on palpation. The tongue showed a thick brownish fur on the dorsum, but was clean at the tip and at the edges. The pulse was in many cases slow; rates of 55 and 50 were common, and in one case the rate fell to 40 during both of two attacks.

The *temperature* usually rose suddenly to 103° F. (105° was the highest noted), remained between 102° and 103° F. for about twenty-four to thirty-six hours, terminating, in the large majority of cases, by a critical fall, and remaining subnormal for three or four days.

The temperature charts showed three main types, depending on the fall and subsequent course of the temperature curve.

(1) Curve showing a critical fall, or much more rarely a gradual one, on the second, third, or fourth day, and remaining subsequently subnormal or normal.

(2) Curve showing a critical fall to normal or subnormal, followed by a further rise, either immediate or after a day or two, the temperature remaining up for one or two days.

(3) Curve showing a critical fall, followed by more than one post-critical rise of temperature occurring at irregular intervals.

Course.—The prostration became more and more marked as the pyrexia continued, and by the time it subsided might have become very severe. The headache disappeared with the fall of temperature, but the backache and the pains in the limbs frequently persisted for several days afterwards; in several cases the pain only became marked after the fall in temperature had taken place. The slowness of the pulse often persisted for four or five days after the temperature fell. Appetite returned gradually, but convalescence was slow, and the patient remained debilitated for a week or ten days or even more.

The *complications* observed were:—

Conjunctivitis.—This was quite severe in one case.

Epistaxis.—This occurred in several cases.

Sore Throat.—This, associated with faucial injection, was observed in several cases.

Vomiting.—This was quite marked in one case, and was not due apparently to any outside cause.

Reinfections were comparatively common. They were almost invariably milder; the temperature seldom rose above 100° F. (101·8° F. was the highest noted), and the rise lasted only one or at most two days. The symptoms and subsequent debility were also much less marked, and no complications were noted. No case of more than one reinfection was observed.

[1] Abstracted from *British Medical Journal*, April 6, 1918.

Review.

Elements of Hygiene and Public Health. By Charles Porter, M.D., B.Sc., M.R.C.P.Edin., Medical Officer of Health, Metropolitan Borough of St. Marylebone. Pp. 411, with 98 illustrations. London: Messrs. Henry Frowde and Hodder and Stoughton. 12s. 6d. net.

The scheme of this book is a definite one for the prevention of disease and health preservation. The object of the author, according to the preface, is to help the medical practitioner to fill his place in the public health scheme. It may be said that the author informs his readers of their duties and obligations. Looking at the work from the point of view of what the practitioner should do, or, that is, what a public official thinks they should do, will be found profitable both to students preparing for examination and those who have taken up practice. Unfortunately, there is a gulf between practitioners and officials which it is hoped this work will bridge over. The scope of this work is wide and comprehensive, and embraces everything that comes within the medical curriculum and practical work of the medical practitioner. It is to be noted that the author, as is not infrequent now in text-books, has devoted a chapter to tropical diseases.

Original Communications.

A SUDANESE STREPTOCOCCAL DERMATITIS.

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CONTENTS. — *Introductory — Historical — Clinical Account—Pathological Histology—Ætiology—Pathology — Classification — Diagnosis — Prognosis — Treatment — Summary — Acknowledgment—References—Illustrations.*

Introductory.—We have had the good fortune to meet with a number of forms of dermatitis of streptococcal origin which have readily yielded to vaccine therapy, and it seems to us to be desirable that a record should be made of some of these observations, as they may possibly be of use to other practitioners. We begin the short series by describing two cases of streptococcal dermatitis of the hand.

Before, however, commencing the description of these cases, it seems to us to be necessary to make clear what we mean by the term "dermatitis," and to do this effectually we must treat the subject historically.

Historical.—In 1916 Norman Walker and Cranston Low decided to reject the old term "eczema," which, they say, has long been, and is still, too commonly applied to any red or scaly inflammation of the skin *of the cause and nature of which the observer is ignorant.*

They define the term "dermatitis" as "inflammation (predominantly) of the surface of the skin."

They virtually divide dermatitis into three classes:—

I. Dermatitis due to chemical causes.
II. Dermatitis due to physical causes.
III. Dermatitis due to parasitic causes.

With this revolution in the study of skin diseases we are quite in accord, and our cases of streptococcal dermatitis will come into Norman Walker and Cranston Low's third class.

When, however, we turn to the exceedingly able article on "Eczema," written by Whitfield in Allbutt and Rolleston's "System of Medicine," we observe that fig. 66, entitled chronic traumatic eczema, depicts two hands suffering from a disease apparently somewhat resembling those with which we are concerned.

We therefore have to ask ourselves the questions what is really meant by the term eczema, and whether Norman Walker and Cranston Low were justified in throwing over this time-old term, and, in order to do this, we must study the history of eczema.

Early History.—At the commencement of the present era Celsus described some forty diseases of the skin, and under the heading "Pustulæ" he mentions a complaint called *Phlyctenæ*, which he describes in the following words:—

"Nonnunquam plures, similis varis oriuntur, nonnunquam majores; pustulæ lividæ aut pallidæ, aut nigræ, aut aliter naturali colore mutato; subestque his humor: ubi eae ruptæ sunt, infra quasi ex ulcerata caro apparet: *φλύκταιναι* Græce nominantur."

In the sixth century Ætius was born at Amida, a town of Mesopotamia, situate on the Tigris. He lived to become Court Physician in Byzantium and to write an extensive medical compilation, of which the short title is "Tetrabiblion" in Book IV, Sermo 1, Capitulum 128 occurs the following line:—

"Eas *ἐκζέματα* ab ebulliente fervore vulgo appellant."

The word eczema was derived from the verb *ἐκ ζέω*, which was employed to signify the breaking out of a disease, and was used by Ætius for burning, itching, non-ulcerating Phlyctenæ or vesicles.

In the seventh century Paulus of Ægina appears also to have employed the term, because Lorry writes:—

"Ita Paulus Ægineta vocat pustulas citra saniem, id est veras papulas *ἐκζέματα*."

However, the term does not appear to have been much used, e.g., Turner in 1714 does not use it, while Lorry in 1777 considers it under "*De Pustulis*," which is a separate paragraph from *De Phlyctænis*, which includes bullous eruptions.

So that we see that even before the days of Willan, with whom the modern history of eczema begins, there was much confusion as to the meaning of that word.

The scientific classification of skin diseases begins in 1776 with Plenck, and though he used not the word eczema, still this classification seems to be the basis of Willan's.

Willan's Eczema.—The modern history of eczema begins in 1813, when Willan's observations were made known to the world in Bateman's "Practical Synopsis," of which we have only the 1820 French edition; but Unna's paper contains an extract from the English edition, and according to this Willan's definition is as follows:—

"An eruption of minute vesicles, non-contagious, crowded together; and which from the absorption of the fluid they contain form into thin flakes and crusts. This eruption is generally the effect of *irritation whether internally or externally applied.* It differs from Miliaria in as much as it is not the result of fever. It may be confined to a small part of the body or extended over the whole skin. It chiefly however affects the inside of the thighs, the axillæ, and those parts in which the numerous follicles are most abundant in men, the under parts of the breast, the vulva and the anus in women. When limited to the fingers, hand and part of the fore-arm it is not infrequently mistaken for Scabies but it may be distinguished by the appearance of its acuminated and pellucid vesicles, by the closeness and uniformity of their distribution, by the absence of surrounding inflammation and by the subsequent ulceration and, in many cases, by the sensation of smarting and tingling rather than of itching which accompany it."

To understand this definition it is necessary to remember that at the time Willan wrote the terrible

dermatitis due to mercury was in full swing, and that the internally applied irritant mentioned above refers to this drug, while the sites mentioned are also those principally attacked by the same drug.

On the other hand, the references to the hand indicate sunburn. It will further be observed that the essential lesion in Willan's eczema is the vesicle. It was therefore classified in his order "Vesicles," which he defined as small orbicular elevations of the cuticle, containing lymph which was sometimes clear and colourless, but often opaque and whitish or pearl-coloured, and which may be succeeded either by scurf or by laminated scabs.

It would appear as though Willan only recognized two forms of eczema, viz., *E. solare*, or sunburn, and *E. rubrum*, caused by the administration of mercury. If this is so, then Bateman began the confusion of modern days by introducing *E. impetiginodes*, which was caused by blistering plasters, and characterized by having pustules in among the vesicles, and which really belongs to Willan's impetigo.

In 1827 Plumbe rejects Bateman's *E. impetiginosum*, as it became called later, and simply recognizes Willan's two varieties, but he states that *E. rubrum* may be caused by opium, antimony and copaiba.

He also says that eczema is most frequently caused by the action of heat on the skin, and he lays stress upon the presence of the vesicles, and, reading this, one is obliged to agree with Unna that Plumbe was inclined to limit the term eczema to its original idea, i.e., to simply *Eczema solare*, or sunburn,which to-day, as the mercurial dermatitis has practically ceased to exist, is the sole form to which the term "eczema" should be applied, and therefore Willan's conception is easily covered by the dermatites due to physical causes.

At this the history of eczema ought to stop, but it is necessary at the present time to outline the confusion which led to the modern impossible position.

Alibert's Dermatoses Eczémateuses.—Among the contemporaries of Willan one must first mention Alibert, but his work is curious. In the first edition of his "Maladies de la Peau," published in 1818, on page 1 he writes:—

"Je transcris ce que j'ai observé, m'inquiétant peu de ce qu'on a dit avant moi. Quand on voit de si près la nature, quel besoin a-t-on de recourir aux travaux des Grecs et des Arabes?"

In this first edition one looks in vain for eczema or for any reference to the works of Lorry, Plenck, or Willan, but Alibert was a shrewd and careful observer, and seems to have noted his error and to have acquired the knowledge he rejected in his earlier years, perhaps as Sabouraud suggests, verbally from the elder Mahon. At all events, in his third edition, published in 1832, there are ample references to Willan and Bateman, whose views had been converted into French by Bertrand in 1820. In this last edition of his work he has as his first group "*Les Dermatoses Eczémateuses*," which include erythema, erysipelas, pemphigus, herpes zoster, ecthyma, urticaria, epinyctis, herpes sudamina, aphthæ, Bagdad boil, carbuncle, and furuncle.

This peculiar classification is due to his view that the pustule is the principal feature of eczema.

He says:—

"On doit à Willan, mais surtout à Lorry, d'avoir bien étudié les phénomènes élémentaires de l'eczémation cutanée. Parmi ces phénomènes il faut mettre en première ligne la forme pustulaire."

But these later writings of Alibert could produce no effect, as the work of Lorry-Plenck-Willan-Bateman had already been continued by Biett, Cazenave, and others.

Chronic Eczema.—We now come to the period of the celebrated Biett, who was a pupil of Alibert, but who, leaving his master's fantasies, adopted in his teachings the simple and practical method of Willan.

He wrote little himself, but his views were well set forth by his pupils Cazenave and Schedel, in whose writings we find eczema classified under the vesicles. In their fourth edition, the only one we possess, they divide eczema into the *acute form*, which is Willan's eczema, and is subdivided into Bateman's three varieties.

They, however, describe under the heading *Chronic Eczema* a disease quite distinct from Willan's original idea of eczema.

These views of Biett were, however, developed by a greater dermatologist than Cazenave, i.e., by Rayer, and all of these authors described not merely chronic eczema, but regional eczemas, e.g., eczema of the hairy scalp, which was Alibert's Teigne Muqueuse and Willan's Porrigo Larvalis, and as Unna has truly said, Willan's clear description of acute eczema becomes amalgamated with features which had nothing in common with a vesicular traumatic dermatitis.

Biett, Rayer, Cazenave, and Schedel recognized a disease made up from Willan's impetigo and porrigo, and this they called "Chronic Eczema."

Rayer's teachings were accepted everywhere, and his Chronic Eczema became gradually the disease which to-day is called "Eczema," but he knew that it was not Willan's Eczema.

Moreover, there was much confusion as to the causation; Willan's Eczema was traumatic, the Biett-Cazenave-Rayer Eczema was of unknown causation and said not to be contagious, yet Rayer says that he collected several cases suggestive of contagion.

Erasmus Wilson was the originator of the classification of the eczemas into erythematous, vesicular, papular, pustular, squamous, &c., and while the French School supposed all forms to be due to some discrasia, the Austrian School believed the disease to be of local origin.

Present Day.—We have now traced the history of eczema up to the commencement of the hopeless confusion of modern times, and if the reader desires to pursue the matter further, we refer him to Unna's excellent paper and to the definitions and

descriptions of eczema given in the works of Crocker, Morris, Sequira, Allbutt and Rolleston, Stelwagon and Gougerot.

If the reader will take the trouble to refer to these writings, we think that he will agree with us that it is impossible to return to the simple eczema of Willan, or to alter the present confusion without some drastic action.

From time to time, as knowledge improved, definite entities have been cut away from the swollen and decaying body of the modern eczema and have often been termed some form of dermatitis, and one cannot but feel that the time has come to follow Norman Walker and Cranston Low and to adopt their simple classification, as outlined above, which has the great advantage that it invites special attention to the causal agent, and this must be of advantage both in treatment and in prevention.

Parasitic Dermatitis.—The form of dermatitis to which we are about to invite attention belongs to Norman Walker and Cranston Low's third class, because we have found a streptococcus, which we believe to be causal, in the cells of the eruption (fig. 3).

The dermatitis under consideration is therefore a Streptococcal dermatitis.

Streptococcal Dermatitis.—Crocker was probably the first observer in 1881 to see and to describe streptococci in a skin disease, i.e., in the unruptured vesicles of a case of impetigo contagiosa, and later Brockhart considered them to be the streptococcus of Fehleisen, i.e., *Streptococcus erysipelatos* Fehleisen 1883, which is more popularly known as *S. pyogenes* Rosenbach 1884.

Since that date this organism has been described as the cause of many forms of cutaneous disease.

Thus Whitfield, writing in 1911, says that it is the cause of impetigo contagiosa, and its associated whitlows, of ecthyma, of erysipelas, or chronic or relapsing deep lymphangitis, which leads to elephantiasis nostras, of suppurative lymphangitis, of whitlows, and perhaps of chronic infective eczema of the acanthotic type.

In the same year Colcott Fox, writing on streptococcal infections, remarks upon Andrewes and Horder's classification of these organisms, and says that the time is now ripe for a research on the forms of this microbe pathogenetic in the skin.

He divides streptococcal skin lesions into:—

I. Lesions in the course of grave systemic infection.
II. Lesions of the hypoderm by infection through the skin.
III. Primary cutaneous lesions.
IV. Secondary cutaneous lesions.

He says that the primary cutaneous lesions are very common, and assume many different phases, but with a generic character.

He cites impetigo contagiosa, ecthyma, vacciniform ecthyma, furfuraceous impetigo, post-auricular pseudo-eczema, perlèche, pemphigus neonatorum, von Ritter's disease, pemphigus contagiosa of hot climates, intertrigo, simple infantile dermatitis of Jacquet, paronychia, a solid œdema of the face, and inflammatory nodules on the hands of milkers as types of streptococceal dermatitis.

With regard to the above list, we cannot agree that pemphigus contagiosus, i.e., *Pyosis mansoni*, is due to a streptococcus, as it appears to be caused by a staphylococcus (*vide* Castellani and Chalmers in the References) called *Micrococcus pemphigicontagiosi* by Clegg and Wherry, which may be the same as *Aurococcus mollis* (Dyar 1895), *vide* Chalmers and O'Connor in the References. Nor can we agree that Corlett's impetigo is due to streptococci, as we believe it to be due to *Aurococcus mollis*, *vide* Chalmers and O'Connor.

We would add to the list dermatitis bullosa plantaris and veldt sore, and also the septic pemphigus due to general streptococcal septicæmia as described by Innes in Khartoum.

Clinical Account.—The fully developed eruption is shown in figs. 1 and 2.

Fig. 1 depicts an eruption of only three months' duration in which the affected area is surrounded by a raised margin, which is most evident towards the fingers.

If this part of the margin is examined by means of a reading lens, it will be noted that small papillomatous-like outgrowths are forming just behind its thenar extremity. These are of interest as indicating clinically a relationship with the lesion depicted in fig. 2, which is older, and in which the papillomatous outgrowths are so much "en évidence" that it gives the eruption a superficial resemblance to cutaneous blastomycosis, *vide* fig. 577 in Castellani and Chalmers' "Manual of Tropical Medicine," which depicts a typical blastomycosis met with by one of us in Ceylon.

Returning to fig. 1 behind the margin in question there lies a deep and tender fissure.

The surface of the sore is composed of deep fissures and a few ulcerated areas which exude a serous fluid which is apt to form crusts. These bare areas and fissures are separated by other areas which are coated by a thin epidermal covering, thus giving rise to a false healing appearance, whereas the margin was most evidently spreading.

The sore is said to have begun some three months prior to the time we saw it as a small irritable spot which was not considered to be worthy of attention. This spot gradually spread, became ulcerated, appeared to heal up, appeared to start again, and this was repeated several times, despite treatment, until the condition of affairs depicted in fig. 1 was reached. This case occurred in an English official.

Fig. 2 represents a similar but more chronic condition as seen in an Egyptian soldier, who states that it is the third or fourth eruption of this nature which, from time to time, has appeared on different parts of his body, but these statements have to be accepted with reserve.

The papillomatous-like condition is easily seen (fig. 2), and fissures and raw surfaces can be observed in the part towards the fingers. These areas and fissures exude a serous fluid.

The surface of the lesion is covered by a thin layer of epidermis.

Remarks.—These two lesions have much in common, and it appears to us that the first case is merely an early stage of the second. Both healed quickly under vaccine therapy, leaving scars, and no fresh lesions have appeared, though months have passed since the treatment.

Pathological Histology.—Sections were made from the papillomatous-like projections, from the epidermal covered, and the raw areas of the second case, but the first case was not examined histologically.

Fig. 5 depicts a section along a papillomatous-like projection. It will be seen that the outer covering is epidermal in nature, and that, superficially, it is covered by masses of scales, both on its free surface and on the surface looking towards another process (the lowest part of the photograph).

This epidermis shows the defect of cornification called *Parakeratosis* by Auspitz, thus fig. 8 depicts the typical parakeratosis as visible on the exposed surface of the projection, where free evaporation is possible, and fig. 4 the less regular form on the side turned towards another projection, and where, evaporation being checked, the parakeratosic cells retain their swollen appearance even when cast off in the form of scales (fig. 4).

With regard to the rete, there is a certain degree of *Acanthosis* as can be seen by a study of fig. 5.

The corium is full of dilated vessels, and is also slightly œdematous and fairly cellular (fig. 5).

The cells (fig. 6) consist of forms with a large, well-stained nucleus, and a fringe of cytoplasm which are supposed to be derived from connective tissue cells.

Plasma cells and mast cells may also be seen, as may an occasional polymorphonuclear leucocyte.

Turning now to the non-papillomatous regions, there is a well-defined epidermis with parakeratosis and acanthosis, while the cellular infiltration of the corium is denser than that depicted in fig. 5 and more like that shown in fig. 7. It is somewhat œdematous.

These sections are so like fig. 63 in Stelwagon's 1916 edition, which is labelled Eczema Rubrum, that it has been thought unnecessary to reproduce photographs of them.

Another piece of tissue includes a raw area, and the adjoining epidermal covered portion.

This latter part is depicted in fig. 9, when it is seen that, although the epidermis shows parakeratosis, yet it is distinguished by the extraordinary development of the acanthosis (fig. 9).

The corium of this portion is not unlike that already seen in the other two pieces of tissue.

In the region where the epidermis is missing (fig. 7) all trace of a normal corium is lost superficially (i.e., towards the white area on the upper right-hand portion of the photograph) and its place is taken by a fibro-cellular exudate.

Embedded in this exudate can be seen the remains of the acanthotic prolongations of the epidermal cells (fig. 7 upper left-hand corner).

In this fibro-cellular mass lie numerous blood-vessels filled with corpuscles, while patches of serous exudation can also be observed.

The cells of the mass are largely composed of the same cells as in the corium of other pieces, but the amount of polymorphonuclear leucocytes in certain regions, and more especially superficially, is marked.

In the deeper part of the section isolated pieces of the ordinary connective tissue of the corium can be seen, while finally, in the depth of the section, well-defined connective tissue is seen containing here and there scattered collections of cells of the same nature, as already described for other portions of the tissue.

The sweat glands, as shown in the right-hand lower corner of fig. 7, are much damaged, and surrounded by cells of the usual type found in these lesions.

Still deeper one meets with fatty tissue, between the cells of which lies an accumulation of the typical cells of the lesion.

Etiology.—The affected area is disinfected by means of absolute alcohol, and a sterile pipette, fitted with a rubber teat, is inserted deeply into the tissue and a small quantity of exudate obtained.

This exudate is placed in Holman's special streptococcal medium, and another portion is made into films on slides.

The films are stained by Gram's method, when streptococci can be seen in the polymorphonuclear leucocytes (fig. 3), and also at times free between the cells.

The tubes of Holman's medium are incubated aerobically and anaerobically at 37° C. for twenty-four hours, when streptococci were found in pure culture in these cases.

Plates were made with nasgar and incubated for another twenty-four hours at 37° C., and *one single streptococcal colony* from such a plate is picked off and inoculated into one broth tube, and thus forms the first strain to be examined.

If desired other strains can be started, but in any case each strain starts from *one, and only one, colony.*

From the parent broth tubes sugars and other media were inoculated by means of a pipette.

The organisms belonging to the two cases mentioned above were obtained in this way, and their reactions are as follow:—

Case I.—The streptococcus grew in the broth tubes in the form of short Gram-positive chains, which failed to produce any coloration when sub-cultured on agar or inspissated ox serum slopes. It only grew aerobically, producing turbidity in the liquid media and the typical streptococcal colonies on agar and blood serum. It did not liquefy gelatine after one month's growth at 22° C.

It produced acidity, but no gas in the following:—

Monosaccharide, glucose; *disaccharides*, lactose and saccharose; *trisaccharide*, raffinose; *alcohol*, mannitol.

It did not ferment salicin nor inulin, but this last reaction we do not now regard as at all important with regard to streptococci.

It produced acid and clot in milk, but did not reduce neutral red, nor did it undergo lysis in bile salts. It was markedly hæmolytic.

Fig. 1.

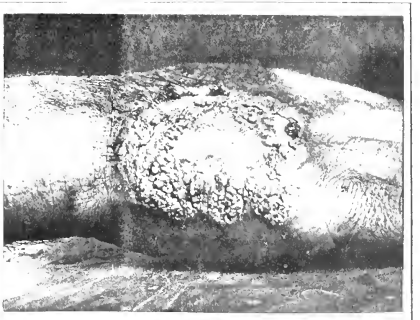

Fig. 2.

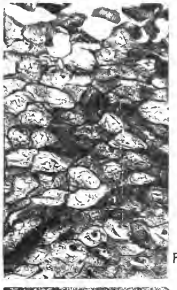

Fig. 4.

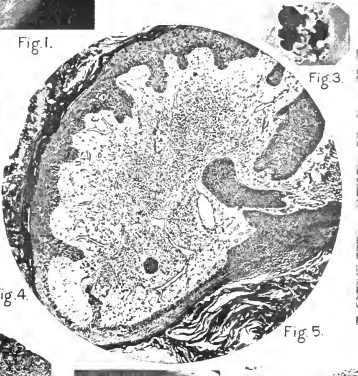

Fig. 5.

Fig. 3.

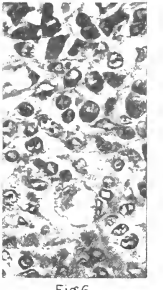

Fig. 6.

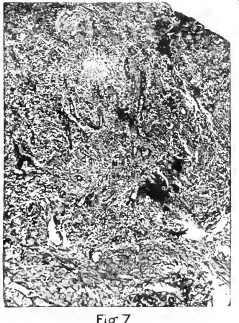

Fig. 7.

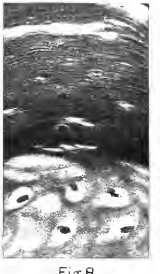

Fig. 8.

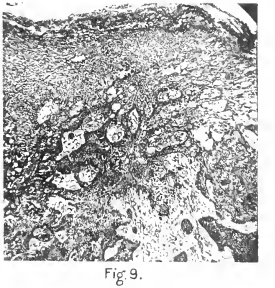

Fig. 9.

To illustrate paper, "A Sudanese Streptococcal Dermatitis," by ALBERT J. CHALMERS, M.D., F.R.C.S., and Major R. G. ARCHIBALD, M.B., D.S.O., R.A.M.C.

Case II.—The streptococcus in this case behaved exactly as the above, but was not hæmolytic, and we do not consider that hæmolysis "per se" is sufficient to justify the formation of a new species, but merely consider it to be a variant character.

Quantitative Reactions.—The quantitative estimation of acidity in terms of cubic centimetres of $\frac{N}{20}$ NaOH is as follows:—

	Case I.	Case II.
Glucose	3·8	3·0
Lactose	2·4	2·2
Saccharose	1·8	2·2
Raffinose	1·8	2·0
Salicin	0·1	0·0
Mannitol	1·0	1·1

Classification.—The classification of these organisms is simple if the following classification of streptococci be adopted:—

PROVISIONAL DIAGNOSTIC TABLE OF STREPTOCOCCAL GROUPS.

A. Parasitic on plants. Grow in broth but not on agar or gelatine	*I. Sphagni group.*
B. Parasitic in animals. Grow in broth and on agar and usually on gelatine:—	
F. Obligatory anaërobes	*II. Fœtidus group.*
G. Aërobes, facultative anaërobes:—	
M. Pigment present	*III. Sanguineus group.*
N. Pigment absent:—	
R. Gelatine actively liquefied	*IV. Gracilis group.*
S. Gelatine usually not or rarely slightly liquefied Inulin usually not fermented:—	
I. Gas produced	*V. Gasogenous group.*
II. Gas not produced:—	
Non-fermenters (a) Glucose and other sugar media not fermented	*VI. Non-fermenting group*
Monosaccharide fermenters (b) Glucose usually and other sugar media generally fermented	
Equine fæcal type 1. *Glucose* alone or with *saccharose* and *salicin*, but not with lactose, *fermented*	*VII. Equine group.*
Disaccharide fermenters 2. *Lactose, glucose, saccharose* and *salicin*, but not *mannitol fermented*	*VIII. Erysipelatos group.*
Human fæcal type 3. *Lactose, glucose, saccharose, salicin, mannitol*, and *sometimes raffinose fermented*	*IX. Fæcalis group.*
Trisaccharide fermenters 4. *Raffinose, lactose, saccharose, usually glucose, sometimes salicin, and rarely inulin*, but not mannitol *fermented*	*X. Salivarius group.*

It is obvious that the organisms which we are considering belong to Group IX, the Fæcalis Group, the various members of which may be recognized as follows:—

DIAGNOSTIC TABLE OF THE FÆCALIS GROUP.

A. Glucose, lactose, saccharose, salicin and mannitol fermented:—	
I. Raffinose not fermented	*S. fæcalis*
II. Raffinose fermented	*S. versatilis*
B. Suppression of one of the characters of the typical subgroup, variants of *S. fæcalis or S. versatilis.*	

The organisms in question vary from the typical *S. versatilis* Broadhurst 1915 in not fermenting salicin, while the first still further varies in being hæmolytic.

Causal Rôle.—We believe that these streptococci are the true causal agent of the eruptions, because:—

(1) They were present in the eruption, and in the polymorphonuclear leucocytes deep in the tissues.

(2) They were grown at once in pure culture.

(3) The eruptions were quickly cured by streptococcal vaccines after local treatment had failed for months.

Pathology.—There is no doubt in our minds that the streptococcus and its toxins were the *fons et origo* of the complaint because:—

(1) Both patients were in excellent health.

(2) Virtually without local treatment vaccines quickly and completely cured the lesions.

Where the streptococcus grew the polymorphonuclear cells were in abundance, where only the toxin acted these were absent, and the more regular appearance of eczema was produced.

Classification.—Certainly these lesions can be classified under Eczema as both clinically (*vide* fig. 66 in Colcott Fox's article in Allbutt and Rolleston's "System") and structurally they agree therewith, and further, they would come under the chronic infective eczema of the acanthotic type which Whitfield doubts whether it is caused by a streptococcus.

In Norman Walker and Cranston Low's classification it is obviously a dermatitis, and its association microscopically and culturally with a streptococcus places it in the parasitic dermatitis, and shows it to be a streptococcal dermatitis.

Here the advantage to the patient of Norman Walker and Cranston Low's classification comes in, for knowing that it was associated with a streptococcus, we gave the vaccine and cured the cases.

These were healthy men, and it does not follow that every case is so simple and that the streptococcus is the only agent, but in these cases it alone seemed to be responsible.

Diagnosis.—The diagnosis is extremely simple: Examine all cases of dermatitis microscopically and culturally for organisms, and when these are not found, then consider physical and chemical causes outside or inside the body.

In this case cocci and short chains depicted in fig. 3 were quickly seen and cultures started, and the diagnosis made and confirmed by the treatment.

Prognosis.—The prognosis is good provided that, as in these cases, the patient is healthy, but in other cases the streptococcus may be killed, and the lesions may not heal because of other causes. We have seen cases like this complicated with a positive Wassermann.

Treatment.—The best treatment is, without doubt, an autogenous vaccine, but a polyvalent local (i.e., made from local strains) vaccine acts quite well.

We generally give ten millions to commence with, then fifty, and, if necessary, one hundred millions.

The affected part should be painted with iodine and a dry dressing applied.

Summary.—There exists in the Sudan a form of chronic infective eczema of the acanthotic type (to use the old nomenclature) which is associated with a streptococcus, which apparently is, at all events, at times the sole causal agent.

Owing to the confusion at present as to what is meant by eczema, it is better to avoid this term and to use the word dermatitis.

The lesions we have described above are types of a "Streptococcal Dermatitis" caused by *S. versatilis* Broadhurst 1915, and are readily cured by vaccine therapy.

This organism is a common denizen in the fæces of horses in the Sudan and elsewhere, and hence the possible source of the infection.

Acknowledgment.—We gratefully acknowledge the trouble which Captain Gibbon, R.A.M.C., took for us with regard to the second case.

Khartoum,
April 10, 1918.

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ILLUSTRATIONS.

FIG. 1.—*Streptococcal Dermatitis* of the hand in an Englishman in the Sudan. Photograph.

FIG. 2.—*Streptococcal Dermatitis* of the hand in an Egyptian soldier in the Sudan. Photograph.

FIG. 3.—*A Polymorphonuclear leucocyte* contained in a film made from the exudate obtained from the interior of a raw area in fig. 1 by means of a capillary pipette. It shows phagocyted cocci, some of which are in short chains. × 650 diameters. Photomicrograph.

FIG. 4.—*Parakeratosis* from a papillomatous-like growth of fig. 2 on the side of the fissure separating it from another similar growth. × 300 diameters. Photomicrograph.

FIG. 5.—Papillomatous-like growth from fig. 2. × 50 diameters. Photomicrograph.

FIG. 6.—Cells of fig. 5. × 500 diameters. Photomicrograph.

FIG. 7.—Raw area in fig. 2. General view. × 35 diameters. Photomicrograph.

FIG. 8.—*Parakeratosis* from a papillomatous-like growth from fig. 2, but on the side exposed to the air. × 300 diameters. Photomicrograph.

FIG. 9.—*Acanthosis* in fig. 2. × 50 diameters. Photomicrograph.

CURABILITY OF MADURA FOOT.

By FREDERICK WOOLRABE,
Medical Adviser to Ministry of Interior, Bangkok, Siam.

THE following case seems to show that there are conditions in which madura foot may recover:—

In 1915 a male Siamese, about 25 years old, came to Puket Hospital very anæmic and emaciated. His foot, a typical madura foot of the white kind, as shown by the microscope, was twice the normal size, honeycombed with sinuses, and with two toes gone.

Treatment was more or less after the following scheme, but he followed it only if and when he liked, viz.:—

(1) Total immersion of foot in weak tincture of iodine solution, 1 in 50 or 1 in 100, for several hours a day.

(2) Painting of foot and lower third of leg with tr. iodi. every three days.

(3) Painting ulcerated surfaces with liq. epispasticus every week.

(4) Occasional courses of pot. iodi. by Curle's method (*Practitioner*, December, 1912).

(5) Large doses of syr. ferri iodide and Easton's syrup at other times.

He left without warning in about five months. Whether *post* or *propter*, his foot was of normal size, and the sinuses were healed. He could walk well and was in robust health.

THE TREATMENT OF HUMAN TRYPANOSOMIASIS BY INJECTIO ANTIMONII OXIDE.

By WALTER E. MASTERS, M.D., L.R.C.P.

A FEW months ago the writer placed on record through the pages of this Journal his findings in the Belgian Congo with regard to the "Symptomatology and the Treatment of Human Trypanosomiasis." In that paper special attention was drawn towards the marked difference between the symptoms in European and native races, and to the results of a series of experiments carried out by the writer's

combined method of treatment for that disease. In those experiments tartar emetic was found to be too toxic to be given in quantities sufficiently large to produce the results one had hoped to obtain from it.

Recently the writer, having secured 2,000 doses of antileutin and 2,000 doses of injectio antimonii oxide, proceeded to carry out more experiments with regard to the treatment of the disease by these medicaments.

The former drug, antileutin, proved to be so painful that it had to be permanently abandoned. All my cases refused to be treated by it; they preferred to die in peace.

Injectio antimonii oxide consists of antimony oxide dissolved in equal parts of glycerine and water slightly heated, and is prepared in capsules of 1 c.c. and 2 c.c., containing $\frac{1}{100}$ and $\frac{2}{100}$ gr. each of the drug respectively. It is prepared and supplied in 100 c.c. sealed phials, of which 2 c.c. to 3 c.c. can be given at each injection, always intramuscularly and not subcutaneously.

Sixty-three cases of trypanosomiasis were chosen for the series of experiments. Of these thirty absconded before they had received $\frac{30}{100}$ gr. of the drug. The remaining thirty-one cases received 925 capsules of the drug between them. These cases were divided into two classes, thus:—

Class A.—In all these trypanosomes were found in the gland juice upon the first examination. Some of them were in the first and some were in the second stage of the disease—that is to say, some were curable and some were incurable. *Our attempt was to clear out the trypanosomes from the lymphatic circulation* as ascertained by repeated gland punctures.

Class B.—In these the cervical lymphatic glands were so atrophied that no trypanosomes could be found, or if they were found at the onset, the disease was so advanced that repeated examinations later would have been impracticable. *Our purpose was to ascertain the influence of the drug upon the course of the symptoms of the disease in late cases.*

Class A.

Of the twenty-one cases in whom trypanosomes were found upon the first examination of the gland juice, twelve were found to be negative and nine postive after treatment. Of the nine positive cases only two had received the minimum course of $\frac{40}{100}$ gr. of the drug, and it is probable that if in these cases soamin had been given in addition the trypanosomes would have been cleared out.

Of the twelve cases therefore:—

Three were negative after three consecutive gland punctures at different periods.

Eight were negative after two consecutive gland punctures at different periods.

One was negative after one gland puncture.

Three of these cases were already in the last stage of the disease. The results in their cases were particularly gratifying.

The results may be summed up thus:—

Cured	10
Improved	5
Unimproved	5
Worse	1

The term "cured" is used in a very restrictive and comparative sense, as such cases should be repeatedly examined and found negative during a period of two years, always excluding reinfection.

An eye-witness of some of these cases, who has had years of experience amongst sleeping sickness peoples, said that he "had never seen such a marked improvement in the general appearance following any other treatment. Resistant cases of over one year's duration had responded in a remarkable manner to the drug."

In all these cases the drug was given in quantities of $\frac{4}{100}$ gr. (four capsules) at each injection every other day deep in the buttock. There was some slight induration locally, but the general reaction was *nil*. There were no accidents except one, who died from malignant œdema, the puncture wound probably becoming infected, resulting from his constantly sitting upon the ground without covering or protection. A dose of $\frac{3}{100}$ gr. each injection would probably be more acceptable to the patient, but the fewer "needle pricks" the better for African patients, as they dread the "needle," it pains them more than the disease, and, to them, the extent of the disease is measured by the severity of the pain.

When $\frac{40}{100}$ gr. has failed to clear out the trypanosomes I gave soamin 0·77 grm. every five days, in addition to the antimony oxide. It is very probable that we shall now be able to cure permanently all cases in the first stages of the disease, referring always to the Congo strain of the parasite.

The method of differentiation between these two stages by a cellular count of the cerebrospinal fluid as practised by Dr. Van den Branden of the Leopoldville Laboratory has not been used by us as it involves additional "needle pricks," and would not be applicable to the treatment of large numbers such as we have to deal with here.

I have not yet tried the drug intravenously for the same reasons. My desire was to find an effective method of treatment which could be administered by native infirmiers who could travel from village to village for the purpose. We have in our district here of about 4,800 square miles, probably 70,000 infected with the disease. We propose to have a number of infirmiers always on tour, and for this injectio antimonii oxide and soamin are the remedies *par excellence*.

I am of the opinion that injectio antimonii oxide given intramuscularly or intravenously is a great advance upon tartar emetic, however administered.

Class B.

We did not consider negative results of gland punctures to be of any significance in these cases. When the glands have become shrunken and fibriotic trypanosomes can seldom be found in them, even

though the symptoms of the disease may be marked and advanced.

Of these ten cases:—

Six died in whom no improvement was noted.

One was slightly improved.

Two were much improved.

One was discharged free from all signs and symptoms of the disease.

We do not attach much importance to the treatment of the disease during the last or cerebral stage. From the above, however, it is worth while to give it.

CONCLUSIONS.

Injectio antmoinii oxide will clear the trypanosomes from the lymphatic circulation more readily than any drug or combination of drugs hitherto applied to the disease.

The general symptoms are more rapidly and more generally cleared up than with any other medicaments.

The drug should be given in $\frac{3}{100}$ gr. doses every other day until a minimum dose of $\frac{40}{100}$ gr. has been given.

If the trypanosomes are not cleared out by the $\frac{40}{100}$ dose soamin, 0·77 grm. should be given in addition to more injectio antimonii oxide every fifth day. One large dose is more effective than many small doses. Injectio antimonii oxide is a great advance on all other methods, and can be administered by native infirmiers en route.

Acute Dilatation of the Stomach (P. O. Bolo and A. G. Gallo, *Semana Medica*, November 29, 1917).—The patient was a woman of 54; the dilatation developed suddenly with intense pain. There was repeated blackish vomit. At laparotomy on the third day five litres of blackish fluid were removed. A posterior gastro-enterostomy was done.

Typhoid Mortality (P. Guizzetti, *Riforma Medica*, February 2).—From 1860, at the Institute for Pathologic Anatomy at Parma, of 378 cases, in only three cases were the intestines found intact. In one child of 6, an ascaris seemed to be responsible for the fatal perforation. The cases with perforation seemed to be more numerous in certain epidemics than in others. Lesions in the lungs were manifest in over 34 per cent., mostly hypostatic pneumonia, but pleuritis was observed in only five cases. In each the typhoid bacilli were responsible for the infarcts in the pleura. Two of the cadavers showed a general hæmorrhagic diathesis, but in the entire 378 cases no indications were found of typhoid lesions in bones or the male genital organs, and none have been observed among the 892 soldiers with typhoid in his field hospital service. Diphtheria, erysipelas, and bacillary dysentery sometimes complicated the typhoid, but in all his experience he has never met with a complicating eruptive disease, measles, scarlet fever, or variola.

Notices.

BUSINESS AND GENERAL.

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THE JOURNAL OF

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JULY 15, 1918.

THE INDIAN MEDICAL SERVICE.

To gain a place in the I.M.S. was for a long time regarded as the acme of the student's career. When a student stood out head and shoulders above his fellow-students they would remark "He is good enough for the I.M.S.," and after qualifying, when he did pass into that service, it was looked upon as a fitting reward and position for so good a man. Why this should have been so, and is so to-day to

a certain extent, it is difficult to quite explain. It may be because in the arts or classical side of the University teaching the good men in either classics or mathematics had the Indian Civil Service dangled before their eyes as a lure and bait to catch them, so the medical department came to attain a reputed glory as if it were in the same category. That it became so there is no doubt, but the reason for this being the case is a question to which many answers could be given. It certainly is the case in the Civil Services. The Indian, the Home, and the Colonial Civil Services stand to each other as first, second, and third in relative importance, and in the quality of men going up for competition for places; so the Indian Army, the Home Army, and the Navy Medical Service are regarded by the young recently qualified medical men entering into the practice of their profession, and the best men go up for the Indian Service. In it the pay and the pensions are higher; there is, or was, a glamour about the Indian Services in days gone by. It placed men early in life in positions of responsibility, and gave them in the Civil Service power unattainable in any other Service in the Empire at an early period in their career.

It must be said that this grading of the Civil and Medical Service men held, and still holds, good. The best men do still look upon the Indian Services as a fitting career for one of their "high attainments," and India gets served by our best as a rule. In the I.C.S. this was the case no doubt, but the glory attaching to the Service was attained originally by men of a different category, and sprung from a different source to that which obtains at present. In earlier days the Civil Service in India was administered by men drawn from the Army who had shown ability in organization, administration, and in one or other of the many departments of knowledge requisite for the government of a country. The great names in Indian administration were originally soldiers, who, on attaining middle life and being found capable, were promoted and became civil governors of provinces, over which they practically ruled. These men had gained their experience in military administration work in the Army; nowadays, and for many years past, they have been chosen from amongst students who have shown proficiency in classics or mathematics at college, and after a year or so of training on the spot are placed in administrative or judicial position whilst still in the twenties. In those earlier days the men were chosen in the forties usually for their already proved administrative abilities; in more recent times they have to gain their experience after entrance to the Service. The natives of India are quite aware of all this, and it has been, and is, at the root of all discontent in India. The older men in India resent the change; they say, "How can you expect us to respect these young lads placed over us? We had only great men in the past, tested before being appointed as to their fitness, not boys fresh from schools or college."

In the Medical Service in India the young doctor is placed with Indian troops, and after a time has to choose whether he will continue with the military or take up the civil branch of the work. An officer, if he adhered to the military branch, was apt to be looked upon with indifference, and it was only by taking up civil work that he had a chance of gaining distinction and, in many cases, a pecuniary competency.

This division of civil and military careers for doctors in India was arranged for when the communication between India and Great Britain was by means of sailing ships, and British doctors could not be expected to proceed to India to take up work on the chance of getting practice. Unless some guarantee of employment was forthcoming, it could not be expected in an exclusive country such as India under British régime for any young medical man to go there on chance. In China and the Malay States a different method was adopted. A number of business houses clubbed together and paid a doctor so much yearly to come out to them. That system holds good in a large measure to-day and works well and smoothly. In India the work amongst civilians was undertaken and carried out by men who had joined the Army, and who remained in the Army, rising in rank as years went on, and only remained liable to military work when war broke out on a more extensive scale than usual, and beyond the power of the regimental doctors to cope with.

This old-fashioned scheme is in vogue with us to-day, and it is upon this rock that the split is threatened.

Some considerable time ago now Indians qualified in British, and later in Indian, schools of medicine were admitted to competition for places in the Indian Medical Service. This worked fairly smoothly until the Indians reached by seniority the higher grades in the Service, when naturally, but most unfortunately, questions arose in regard to promotion, &c.

The friction will increase if the present system is still continued. Many wise heads have brought forward schemes for dealing with the question of the practice of medicine in India, but as yet it is unsolved.

One plan is to place the whole of the Medical Service of India under the Director-General of the Army Medical Service in the War Office in Whitehall, and deal with the Indian Army Medical Service through the R.A.M.C. Here again a difficulty arises, for, according to stipulations of service, the R.A.M.C. officer must be of pure British stock, whilst Indians are meantime admitted to the Indian Medical Service. The competition would have to be thrown open to both British and Indian doctors, and it is easy to see the stumbling-block likely, and almost certainly, to arise. For, were the whole grouped together, British medical officers might be told off to Indian regiments and Indian medical officers to British regiments.

Another plan suggested several times in the pages of this journal was to create a separate Civil Medical Service in India on a footing with the Colonial Medical Service in vogue in Africa, the West Indies,

the Malay States, China, and elsewhere. This Service to be managed by the Government of India, and British and Indian doctors admitted. Until a Civil Medical Service for India is created the muddle will go on. Military and civil work cannot be mixed as at present without causing trouble. We have the R.A.M.C. for our military wants in Britain, in our colonies, and dependencies; let that be extended to India. We have the civil hospitals in these colonies and protectorates managed by the Colonial Office, and very well done, although it is quite unorganized, except perhaps in the West African Medical Service. Under the India Office in Whitehall it is just as possible to organize a service for India. And, as in the Colonial Office system, members of their medical staff are not for the most part allowed private practice, so it should be in India. The private practice should be done by private practitioners, men who are not under the military or Colonial or Indian Medical Services, but private practitioners as they are at home and in most British Crown Colonies and Protectorates. India is not so far off as is the Far East, and yet to the latter practitioners go in a private capacity to treat sickness amongst all and sundry who come to consult them. There is no reason why this should not hold good in India, and there never will be a satisfactory settlement until the old régime, founded at a time when India was far off, is swept away, and a military, civil, and a private practitioner department is created for India on the same footing as in the rest of the world, where the three groups fulfil the medical requirements of every civilized country. The difficulties are not insurmountable, and India, so long wrapped in a cloud of mystery, is no different in its everyday life from any other country.

Annotations.

Epidemic Dropsy (F. Leporini, *Polyclinico*, February 10).—Cases in Northern Africa of a low febrile state with vomiting and diarrhœa; suddenly there develop anasarca, a peculiar eruption, and acute anæmia and intestinal disturbances. It is the first time that this epidemic dropsy has been known in Northern Africa. The necropsy findings in the liver and kidneys resemble those of amyloid degeneration. He is convinced of the infectious origin, but accepts also a predisposition from some alimentary deficiency. This assumption suggests that epidemic dropsy might properly be called "infectious beriberi."

Myiasis of the Bladder (A. Mendez, *Revista de Medicina y Cirugia*, April 10).—A huge calculus almost filled the bladder of a girl, it was removed by a suprapubic incision, and larvæ of the fly, *Lucilia macellaria*, were found in the crevices of the calculus. There had been no appreciable symptoms from the myiasis, but the healing of the wound was delayed by severe hæmorrhages.

Prophylaxis of Infectious Diseases at Buenos Aires.—E. R. Coni (*Semina medica*, February 7) tabulates the statistics since 1877 in regard to the death-rate from infectious diseases. The total average in the first decade was 33·2; in the decade ending with 1916 it was only 6·6. The relative mortality from diphtheria and croup per ten thousand inhabitants has dropped from 91 to 16; of typhoid, from 59 to 23; of measles, from 17 to 10; of scarlet fever, from 8 to 3; and of whooping-cough, from 11 to 6. The fact that all prophylactic measures have weak links is confirmed by the severe epidemic of measles in 1915, with the unprecedented mortality of 358 deaths, far more than in any of the four previous decades. Diphtheria also was responsible for 402 deaths in 1915, nearly twice as many as in any year since 1886. Yellow fever, cholera, and small-pox have been conquered. Yellow fever in 1871 killed 20,000 in three months out of a population of 80,000. It is not enough to pass laws in regard to vaccination against small-pox. A personnel must be organized to enforce them. This has been done so effectually that there was only one death from small-pox in 1914, one in 1915, and none in 1916.

Prophylaxis of Cholera (D. A. Mazzolani, *Policlinico*, March 10).—Isolation of cholera vibrio carriers in special quarters is one of the most effectual of the measures for preventing the spread of cholera. The public appreciate the necessity for this isolation, and it meets with no opposition. The emission of the vibriones is irregular, but as a rule it is continued in convalescence not later than the tenth or twelfth day. Of the fifty-eight carriers or suspects some showed no signs of the vibrio for three or four days, and others not till later than this. They disappeared from the stools of twenty carriers in five days, twelve carriers in ten days, seven carriers in twenty days, and in nine others between the twentieth and thirty-fourth days. The intermissions with negative findings were from three to sixteen days in length. One convalescent had five positive periods. Cholecystitis for which the vibriones are responsible may be the cause, or there may be actual reinfection. This suggests the necessity for special measures addressed to the cholecystitis and to warding off secondary or repeated infection. Hexamethylenamin seemed to hasten the disappearance of the germs.

Painful Echinococcus Disease of Liver (A. Chauffard, *Annales de Médecine*, November-December, 1917).—Hydatid cyst in the liver is not a disease of the liver, properly speaking, but an accidental parasitic graft which develops slowly and insidiously, not attracting attention until the size and weight begin to annoy. Pain does not form part of the clinical picture, but there may be an inflammatory reaction with development of adhesions which bring

pain, and may even simulate gallstone mischief. The pain is a warning of superposed infection, as otherwise the parts yield to pressure, without pain. Cases are described which led to erroneous conclusions. In one physician of 38 a catarrhal jaundice, and what seemed to be gallstone colics, compelled an operation, but no gallstones could be found. The common bile duct was enlarged, but was not opened. At a later operation the common bile duct was found full of hydatid cysts, and a large cyst found in the liver was evacuated. The findings indicated primary localization of the parasites at both these points. In differentiation from gallstones, the shape of the enlarged liver, its anterior outline, differ materially from what we see with gallstones. If the liver is not enlarged, differentiation may be difficult, especially if the cyst is pressing on the lumbar plexus or other nerves, deceptively simulating gallstone colic. Or the toxins generated in the cyst may induce reflex pain.

Dysenteric Abscess of the Liver (E. Job and A. Spick, *Annales de Médecine de Paris*, December 17).—Of ninety-two cases of dysenteric abscess of the liver in northern Africa, Europeans were affected more than the natives, and the disease is exceptional in the blacks. In an amœba country enlargement of the liver should always suggest dysenteric abscess, although the patient may not have any history of dysentery. In eighteen of the ninety-two cases there had been no known dysentery symptoms. Polymorphonuclear leukocytosis is an important sign of dysenteric abscess. Radioscopy and puncture aid in the diagnosis. When discovered early, emetin may cure after the pus has been evacuated. Injection of the emetin directly into the liver is advocated besides. When all else fails, operative treatment should be considered after thorough emetin treatment.

Malaria in the Macedonia Expeditionary Force (P. A. Delille, *Annales de Médecine de Paris*, December 17).—The epidemic of malaria that has affected the armies operating in Macedonia forms, if not the most important, at least one of the most important military epidemics known in history. Not since the armies of Xerxes were decimated by malaria in that same region has there been a situation comparable to that of these modern forces in the Macedonian valleys and marshes. The extreme gravity of the infection, the early and large proportion of pernicious cases, the apparent failure of preventive doses of quinine, the prevalence of malignant tertian malaria—the quartan type was rare—and the frequency of hæmoglobinnria, were special features.

War Œdema and Bilateral Parotid Enlargement (F. A. Park, *Bulletin of the Canadian Army Medical Corps*, April).—This is a condition so peculiarly German, to speak of the condition as " war œdema " is incorrect; it is not war but purposeful underfeeding that is the primary cause. It is a famine œdema, not a war œdema, occurring among the prisoners of all nationalities who were fed on German rations only. Kriegsœdem is the result of underfeeding, especially in fat and protein. It can be cured easily in the early stages by sufficient diet. When well established it is frequently complicated by a colitis, when the mortality is high. The condition commences as slight œdema of the feet and legs, disappearing when the patient is recumbent. Patients are seldom admitted to the hospital in this stage, although proper feeding with rest in bed would completely restore them in a few days. The usual type found in the hospital presents a massive œdema of feet, legs, thighs, and scrotum, with some puffiness under the eyes. Ascites is common. The patient is pale and dull; indeed, the appearance is strikingly like that of a case of parenchymatous nephritis. There is extreme muscular wasting and weakness. Dyspnœa is only present on exertion, except when there is hydrothorax. The heart is slightly enlarged; the action is regular, but usually slow; the muscle tones are poor, and the second aortic sound is not accentuated. Blood-pressure is low. There are commonly many moist râles in the lungs posteriorly, especially toward the bases. Uncomplicated cases are afebrile. In the most serious cases there is a general anasarca, the chest and abdominal parietes are œdematous, and all the serous sacs become filled with fluid. In one case 15,000 c.c. of watery fluid was removed from the pleural sacs in six punctures during two weeks. In a few cases paracentesis abdominis was done. Hydropericardium was common, but never extensive enough to require withdrawal.

Twenty cases had a bilateral condition of enlargement of the parotid glands. The enlarged glands were at no time hard or painful, but rather they were soft and doughy, the swollen regions being easily pinched between the finger and thumb. The condition was afebrile; in no uncomplicated case was a rise of temperature associated with it. It was never accompanied by orchitis, and it tended to persist indefinitely.

Genital Complications of Typhoid and Paratyphoid (A. Cade, E. Vaucher, and G. Huchon, *Progrès Médical*, February 16).—Seven cases of this kind have been published in France in the last three years, and five more are here reported. The orchitis was on one side only in this group of five. In two of the cases the typhoid and in three paratyphoid B bacilli were found. In two of the last three the lesion suppurated, and in one the suppuration kept up a long time, the testicle actually melting away. There were no other signs of disturbance in the urinary apparatus, so the infection was probably blood-borne.

Malarial Tremor (H. de Brun, *Bulletin de l'Académie de Médecine*, March 26).—Tremor is noted in nearly every case of secondary malaria.

The tremor sometimes is so intense that it interferes with the man's work as a draughtsman or painter and with writing and playing an instrument, but usually it is too slight to attract attention. The tremor varies in its intensity; in two cases exaggeration of the tremor warned of an impending malarial attack. In the majority of cases it seems to be the expression of a toxi-infection, but in others some organic lesion is evidently responsible.

Abstract.

A FATAL CASE OF PARATYPHOID B SIMULATING TYPHUS FEVER.[1]

By P. S. Hichens and E. J. Boome.

The following fatal case of paratyphoid fever due to the *Bacillus paratyphosus* B seems to be worth noting, not only from the extreme severity of the lesions found post-mortem, but also from the clinical course of the disease.

On admission to this unit the patient presented a clinical appearance almost indistinguishable from an advanced stage of typhus fever. He was in a state of low muttering delirium with carphology, coma-vigil, and retention of urine; there was a faint purple petechial and macular eruption on the chest and abdomen. Had we not had the advantage of skilled bacteriologists to examine the patient both before admission to this unit, and also while here, the condition would almost certainly have been diagnosed as an advanced stage of typhus fever. Owing to our situation at the Front, it has been impossible for us to search the literature and ascertain whether many other such cases have been already recorded. As far as we have been able to learn the number of severely toxic cases of paratyphoid is very small.

The kidney lesions in this case were remarkable, and Hurst in his book, "Medical Diseases of the War," seems to describe a somewhat analogous case suffering from paratyphoid A, in which death occurred from suppurative nephritis in the fifth week. Death occurred in this case on the fourteenth day from what might be called "a pyæmio condition," and in all the abscesses the *B. paratyphosus* B was found.

Condition of Patient in the Line.—The patient had had two doses of anti-typhoid vaccine in December, 1915, and two doses of the triple vaccine (T.A.B.) in June, 1917. He had served nine months in France, and had reported sick at odd times before with very minor ailments. On September 17, 1917, when the battalion was in the line, he complained of pains in the stomach and diarrhœa of sudden onset. Next day he complained of pains in the head and legs, with shivering; temperature 101·2°; diarrhœa better. He was sent by the regimental M.O. to the field ambulance as P.U.O., and was detained there for the night. On September 19 he was evacuated to a clearing station, complaining of pains in the head and across the abdomen, with pain also in the muscles of the thigh and calf. On September 20 there was pain and tenderness in the epigastric region, with cramps in the hands and legs, vomiting, rigors, and cough. On September 24 abdominal pain was complained of, the lower abdomen being tender, but not rigid. The patient complained of retention of urine, but passed a small quantity after suprapubic fomentation. From September 25 to 29 the condition was much the same; the urine passed in twenty-four hours varied between 4 and 12 oz. On September 29 *B. paratyphosus* B was found in the blood on culture. The spleen was palpable and the urine smoky. He was transferred to the infectious casualty clearing station.

Condition of Admission.—The patient was semi-comatose, with dusky and livid face. There was retention of urine and the bowels were confined. Epistaxis occurred. After a while there was low muttering delirium and carphology. The abdomen was slightly distended and tender, the spleen readily palpable; there were no typical rose spots, but on the chest a fine petechial eruption with subenticular mottling in the axillæ. Next day the patient was much worse, wildly delirious, and trying to get out of bed. Signs of consolidation were found in the left lung and at the base of the right lung. A simple enema was given with satisfactory result. 10 oz. of bloody urine were drawn off by catheter. The patient died at 5.45 a.m. on September 31.

Post-mortem Examination.

On the abdomen and front of chest there were a few pale petechial spots.

Left lung: Adherent all over (old adhesions). Large hæmorrhagic infarction in lower lobe; area of infarction with pneumonia in upper lobe. Right lung: Free from adhesions; lower lobe completely consolidated; early grey hepatization, with red hepatization of contiguous portions of other lobes. There was inflammatory exudate between the lobes.

Ileum congested along whole length, with acute inflammation of mesentery in this area; glands enlarged, congested, and hæmorrhagic; Peyer's patches along last three feet of ileum swollen and congested; no ulceration. Large intestine contained fluid fæces; diffuse inflammatory changes along cæcum and ascending colon.

Surface of left kidney studded with yellowish-white nodules and in places definite abscesses with fluid pus; on section kidney riddled with abscesses. Similar septic condition of right kidney.

The liver showed cloudy swelling; gall-bladder markedly distended. Spleen enlarged and congested; hæmorrhagic spots on section. The bladder showed well-marked purulent cystitis. Brain and medulla: Some excess of fluid, but no meningitis.

B. paratyphosus B was grown from urine, kidney abscesses, bladder, and spleen.

[1] Abstracted from *British Medical Journal*, April 6, 1918.

Original Communications.

PELLAGRA.

By A. Viswalingam, L.M.S.
Assistant Surgeon, District Hospital, Larut, Taiping, Malay States.

Pellagra may be defined as a disease of unknown origin, characterized by periodical attacks of gastro-intestinal disturbance, skin lesions, and degenerative changes in the nervous system.

The history need not be referred to at length, as an excellent account of its first appearance and subsequent distribution is to be found in Castellani and Chalmers' "Manual of Tropical Medicine." A short résumé, however, may not be out of place. In 1735 Casal described the disease for the first time and called it "*mal de la rosa*." It was then said that the peasants, among whom it occurred, subsisted mainly on corn, and used meat very rarely. In 1771 Frapalli gave the name *pellagra* to the disease owing to the rough nature of the skin in afflicted individuals. In 1810 Mazari asserted that the disease was identical with *alpine scurvy* (a synonym for *pellagra*), and put forward the maize theory. He was later supported by Lombrosa. In 1905 Sambon asserted that it was a protozoal disease, and that a species of *simulium* served to spread it. Since then there have been many adherents to this view. The disease is prevalent in the South of Europe, especially the Balkan States and Italy. It has also been found in France and Austria, and lately in the British Isles; and cases have occurred in Egypt and Algiers. It is met with in the Southern States of America, in the West Indies, in India, and Ceylon.

It will thus be seen to occur all over the world, irrespective of race, climate, &c. I may perhaps quote here what Castellani says in summing up the history of the disease. His words are: "The history of *pellagra* demonstrates the ease with which the disease may be overlooked, when abundantly present, by well-trained and most competent observers. It also impresses us with the fact that *pellagra* should be looked for in every country without any preconceived idea as to its ætiology."

Ætiology.—Anyone approaching this question to-day encounters many theories, of which the following are the most important:—

(1) That it is one of the diseases caused by some deficiency in food—a deficiency in the *vitamines*, as in the case of beriberi or scurvy.

Advocates of this view assert that *vitamines* preventing *pellagra* get destroyed in the mode of preparation, or as a result of bacterial or fungoid infection of that particular article of diet of the given individual. They also assert that the cereal may, by nature, be deficient in these *vitamines*, and thus cause the disease. In support of this view they argue that, as the beriberi-preventing *vitamines* could be destroyed by the process of milling or superheated steam in the preparation of rice, so in *pellagra* those cereals on which the person subsists may be deficient in the *vitamines*. They also believe that as methods of preserving food (animal or vegetable) by sterilization at high temperatures destroy the *vitamines* that are necessary for the proper metabolism of the organism, so people who live on preserved food instead of fresh food may develop *pellagra*.

(2) That it is a parasitic infection.

This view was brought forward by Sambon, his reasons being: (1) The increase of mononuclear cells in the blood, (2) the response of the disease to arsenic, and (3) the prevalence of the disease in country districts, particularly among field labourers who were most exposed to the bites of insects, which, he thought, served as the medium in transmitting the disease from one individual to another. He believed it to be related in some way to moving water which probably serves to harbour these insects.

(3) The maize theory, which is really part of the deficiency theory.

The advocates of this theory assert that maize, good or bad, when eaten causes the disease in certain individuals. These authorities are again divided among themselves. Thus some assert that maize, in combination with sunlight, brings about the disease. Others say that it may be infected with bacteria or fungi and so cause the disease. Others, again, assert that maize, in the presence of *B. coli communis*, produces a toxic condition in the gut, which results in the individual developing the disease.

Applying these different theories to the ætiology of the disease in this country, I think we may safely reject the maize theory, as maize is but little used here.

It will be found that most of the patients are field labourers, chiefly mining coolies, working in open cast mines owned by Chinese. These mines are usually situated in open country, with several streams and large pools of water on all sides of the attap sheds where the coolies are housed. There is no vegetation worth speaking about. Innumerable small collections of stagnant water, harbouring all forms of larvæ, can be found in the vicinity, and there is little or no attempt at hygiene in the lines. The conditions that must prevail where hundreds of coolies live in a most primitive state may be left to the imagination. The drinking water is obtained from surface earth wells 3 ft. or 4 ft. deep. Just in front of the lines are the bathing ponds, full of muddy water. The benefit derived from a bath under such conditions is questionable. On rainy days, when the ground gets flooded, the bathing and drinking ponds are practically one sheet of water, laden with all forms of imaginable filth. The water for cooking comes from the same source as the drinking water. The disposal of sewage is most primitive; in fact, it is left to Nature, so that rain, sun, and insects each have a share. It would seem that here are the very conditions favourable to harbouring the insects and bacteria that may serve to spread the disease—that is, if we accept Sambon's view. In support of Sambon's theory,

I must also mention that in almost every case I noticed a marked *lymphocytosis*.

On the other hand, if we are to accept the deficiency theory, we find also there is material to support the view. The diet of the Chinese coolies consists chiefly of raw rice and vegetables, which are more often stale than fresh. Such coolies are particularly fond of the preserved vegetables that come from China. Meat with other forms of protein supply is a luxury which can be indulged in only by those that are able-bodied and can earn a few more cents by putting in extra hours of work. Those men who are poor in physique can put in only a few hours of work and must deny themselves such luxuries. It will also be seen that subsistence on the same kind of food from one end of the year to the other does not improve the appetite or supply the demands of metabolism.

Considering the above circumstances, I trust I shall not be far wrong if I express an opinion that both the deficiency theory and the parasitic theory may hold good in the ætiology of the disease in this country. I am inclined to think that, in individuals whose vitality is lowered by exposure and hard work, some organism gains entry into the system by way of the alimentary canal and sets up a condition of intoxication, which manifests itself in the varied symptomatology seen in this disease. I also think that the disease in the early stage commences with gastro-intestinal troubles, followed later by cutaneous and mental symptoms. I must also say that the condition of chronic fibrosis observed in all the organs drained by the portal system seems to incriminate the alimentary canal as the portal of invasion of the organism, whatever that may be. The periodical exacerbation may be explained by the seasonal variations of flies and other insects, and partly by a variation in the resistance of the individual.

Now let us turn to the other factors in the ætiology of the disease.

Age.—In all cases this varied from 35 to 50 years —past middle age as it applies to tropical countries —thus again pointing to lowered vitality. No children were observed to suffer. This is probably due to very few of them being employed in manual labour.

Sex.—All the cases were male. No females live in these mining areas.

Occupation.—All the patients were field labourers, mostly mining coolies working in open cast mines and living on the premises.

Morbid Anatomy.—In all five cases in which a post-mortem examination was made the following conditions were noticed:—

The bodies were emaciated, and in some cases œdema of the lower limbs was present.

On section: The heart was found atrophied; the lungs did not show any marked changes except for a sort of glazed appearance of the pleura; the peritoneal cavity in some cases contained a fair amount of serous fluid; the liver showed degenerative changes, with marked fibrosis; the spleen was normal, or less than normal, in size; the capsule thickened and the substance tough; the pancreas showed marked fibrosis, and in one case cut gritty on section. To the naked eye the walls of the stomach and the small intestines were atrophied. These changes were more marked in the mucous coat. The muscle was so thinned as to be almost translucent. The œsophagus showed similar changes. The large intestine showed the presence of ulcers in two cases, but in the others no lesion was found. The suprarenals and the kidneys did not show any marked change. The morbid conditions in the central nervous system were more constant; there was an increase in the cerebro-spinal fluid; the dura was found firmly adherent along either side of the superior longitudinal sinus, especially at its posterior half. The pia mater was found thickened over the middle and posterior third of the cerebral hemisphere and the cerebellum.

Symptomatology.—The symptoms of this disease are very varied. For the sake of conveience, I may describe the disease as consisting of two stages, viz., the stage of prodromal symptoms, and the stage of symptoms proper.

The Prodromal Symptoms.—There is at first a disinclination for work. Fatigue and general muscular weakness, particularly marked in the legs, are often complained of. There is loss of appetite with occasional attacks of diarrhœa. These symptoms are soon followed by skin lesions, markedly symmetrical, commencing as an erythematous discoloration of the skin on parts of the body exposed to the sun's rays. There may be occasional attacks of vertigo which sometimes cause the individual to fall down. The patient thinks little or nothing of these minor symptoms, and may go on, it may be for weeks or months or years, until he reaches a stage that compels him to seek admission into hospital.

The Symptoms Proper.—The patient complains of general weakness and numbness of the legs (pee, as he describes it), and diarrhœa and discomfort after meals. He seldom refers to skin lesions, however advanced they may be. This is probably due to such lesions not interfering with his work. The Asiatic patient is too philosophic to trouble his mind about such conditions, as they are, to his way of thinking, too trivial to take notice of. His struggle for subsistence is so hard that he cannot afford to direct his attention to anything beyond what is most pressing or will disable him for work.

At this stage, when he presents himself at the hospital, he has passed through the prodromal stage, and will present well-marked clinical manifestations.

These may be divided into three main groups, viz.: (*a*) The gastro-intestinal; (*b*) the cutaneous; (*c*) the nervous symptoms.

The Gastro-intestinal Symptoms.—The tongue is raw in appearance, and its dorsal surface cracked and fissured. The edges are denuded of epithelium, presenting a serrated appearance. The mucous coat is much thinned out, and the papillæ less prominent. The saliva is so excessive that in some cases the patient cannot open his mouth or put out his tongue without its dribbling down his chin. In

some cases dryness of the mouth is complained of. This occurs at a later stage of the disease. The gums may be swollen and tender, and pyorrhœa may be present.

The mouth, pharynx, and œsophagus may be so inflamed that the patient complains of a burning sensation down his throat. There is loss of appetite and discomfort after meals. In some cases the appetite is voracious. Some patients complain of sore throat. Diarrhœa may be present; several liquid yellow stools, without, or occasionally with, mucus or blood are passed daily. There is no tenesmus. In some cases the diarrhœa may be so marked as to disturb sleep.

The Cutaneous Manifestation.—These may appear in various forms. The skin on the dorsum of the feet and hands is erythematous, not unlike sunburn. The skin involved may be of a dull red or dark brown colour, and bullæ may appear which may burst and ulcerate. The lesions will be seen to be markedly symmetrical, and sharply defined from the healthy skin by a pigmented border very often raised above the surface. The elasticity is lost, and the affected area is firm and leathery, both in consistence and appearance. At the later stage the skin peels off in the form of scales, and assumes a condition not unlike an exfoliative dermatitis. All these changes appear to be confined to the epidermis and the superficial layers of the dermis. Most often a dark brown pigmentation is seen in the affected patches. This appears most commonly on the dorsal surface of the hands and feet, the nape of the neck, the front of the chest over the manubrium sterni, about the anal and perineal regions, the back, the external ears, and in a few cases on the cheeks.

The distribution in the upper extremities extends from the wrist to the base of the nails. In some cases it extended upwards to the dorsal surface of the forearm, back of the elbows, and in one case to the shoulder. In a few cases the front of the wrists and palmar aspects of the thumb were found involved.

In the lower limbs it extends from the ankle folds to the nail folds. In some cases it extended upwards to the lower third of the legs, and, in one case, to the lower third of the thighs along the extensor surface.

The appearance of the skin lesions about the anal region and in parts protected from the rays of the sun would show that the skin is very sensitive, and that there are other sources of irritation, such as may be caused by the rubbing of clothes. The skin lesions were seen to clear up in hospital, but in cases where the patient remained for any length of time they recurred.

The Nervous System.—In almost all cases there is well-marked muscular weakness, particularly of the legs, and there were various forms of parasthesias. The superficial reflexes are present, but the tendon reflexes, such as the knee-jerk, are absent or sluggish. The gait is unsteady, probably due to muscular weakness and inco-ordination. Vertigo is also present, but this can only be ascertained on careful inquiry. Most of the patients are dull and apathetic; a few are melancholic; some appear as if they were tired of existence.

Delusions of persecution were present in one case, the patient being also very loquacious; he begged everyone who approached him not to hurt him. Many complain of insomnia. In almost all tenderness can be elicited along the posterior nerve roots; in some cases in the lumbar, in others in the upper dorsal, and in a few all along the back on one or both sides of the spine. In many the blood did not show the presence of any parasite. A differential count in almost every case showed an increase in the mononuclear cells, particularly the hyaline. I thought the increase was in the small lymphocytes in the early cases, and in the hyaline itself in the more advanced cases. The small mononuclears varied from 30 to 40 per cent., and the hyaline cells from 5 to 20 per cent.

The urine showed the presence of indican, pointing to some toxic process in the intestine. The stools showed nothing of importance, except that they were always liquid and contained occasionally some mucus or blood. In two cases a few *Anchylostoma duodenale* ova were found. There was no anæmia noticed in uncomplicated cases.

The facies of the patient is peculiar. The individual appears morose or melancholic, and sometimes presents a woebegone appearance, as if he were tired of life. Most patients were emaciated, and a few had œdema of the legs, which disappeared, and recurred for no apparent reason.

The temperature was normal, except in a few cases which had slight fever now and then for some days, the temperature not exceeding 100° to 101° F., and subsiding without treatment. On the whole the disease may be said to be afebrile.

The heart and lungs showed nothing abnormal. The arteries were not thickened, and the pulse, if anything, was small in volume and low in tension. There was no enlargement noticed clinically in the abdominal organs. In some cases ascites was present, especially towards the later stage of the disease. The bladder and rectum were not affected. Progressive loss of weight was noticed in most cases. A most troublesome symptom complained of is a burning sensation at night, described by the patient as "feeling hot."

Diagnosis.—In a typical case presenting gastro-intestinal, the cutaneous, and the nervous manifestations, there is little difficulty in arriving at a diagnosis. But in others, where the skin changes are absent or less marked, there is real difficulty. I may quote here what Castellani and Chalmers say on this point, viz.: "For the diagnosis of *pellagra*, two conditions are necessary in the observer. The first, that he must suspect its presence and be on the look-out for it in any and every country; and the second, that he must not be unduly swayed by any ætiological theory, and must be prepared to make a diagnosis of pellagra in any person, of any age, any race, any social condition, being in any place, whether tropical, temperate, or frigid, resident in the town or in any

country, and he must do this without consideration to the dietary or the surroundings, with perhaps the sole exception of being more intensely awake to the possible occurrence of the disease in lunatic asylums."

A diagnosis of pellagra should be made if a patient shows gastro-intestinal or the mental symptoms in the presence of cutaneous lesions, especially of a symmetrical erythema or dermatitis on the exposed parts of the limbs. Other symptoms can usually be elicited on careful inquiry. The stomatitis and the discomfort after meals, propably due to a condition of hypochondria and diarrhœa, in conjunction with the skin manifestations, should suffice for a diagnosis. The insomnia and the vertigo, when present, clinch the diagnosis. But Chinese patients think nothing of occasional attacks of giddiness.

Differential Diagnosis.—Sprue is a disease liable to be confused with pellagra. But the absence of skin lesions should rule it out of the question. Skin diseases and sunburn can be eliminated by the absence of the associated stomatitis and diarrhœa and the mental symptoms.

Obrezia is said to have tried the Abderhalden test with success.

Prognosis.—This seems to be very unfavourable. Over 60 per cent. of my cases died, and of the rest I do not claim to have brought about any cure. I have no doubt that most, if not all of them, will ultimately come in worse than before, and in such a condition that no treatment will be of any avail. As in all other diseases, the earlier the case is taken in hand the better the chance of cure. I noticed that progressive loss of weight, combined with persistent diarrhœa and ascites, were unfavourable signs.

Death seems to be due to sheer exhaustion from the diarrhœa, probably influenced by mental changes.

Treatment.—The treatment in almost all of my cases has been more or less symptomatic. I found arsenic in its various forms of no use. I have given pepsin and hydrochloric acid in the hope of remedying the condition of hypochlorhydria, with temporary relief in some cases. Bismuth was given for diarrhœa, with no marked improvement. Hypnotics are of no avail unless continued as a routine treatment, which, of course, is not desirable. A liberal diet consisting of fresh meat, milk and eggs, and removal from insanitary surroundings seem to have done much to improve the condition of the patient. I have no doubt that better surroundings and a liberal diet would go a great way to preventing, if not to alleviating or curing, the disease.

Case 1.—L. Guah, a male Chinese, aged 28 years, rickshaw puller by occupation, and living at Taiping, was admitted to the District Hospital on February 1, 1918. Patient gives a history of having had an attack of "dysentery," three years ago; also had chancre and bubo about a year back. He now complains of headache, occasional attacks of vertigo, eruptions on the hands and feet, and front of chest, soreness of the tongue, intense thirst, loss of appetite, and diarrhœa. He has had these symptoms for the last four months. Patient is emaciated. The knee-jerks are sluggish; the gait unsteady. Tongue is raw and serrated at the edges. The saliva is excessive. He has an erythematous dermatitis on the dorsum of the hands and feet. The patch of skin involved is firm and inelastic, of a dark brown colour, and slightly raised from the surrounding skin. A similar lesion is seen on the chest just over the sternum, extending from the lower end of the manubrium to the gladiolus. There is tenderness in the mid-dorsal region of the spine. The stools and urine were negative on examination. The blood was positive for Wassermann reaction. He has a persistent diarrhœa and has lost flesh rapidly.

Case 2.—L. P., a Chinese male, aged 42 years, was admitted to the District Hospital, Taiping, on February 5, 1917. He is a mining coolie, and lives in a mining kongsi at Kamunting. He came to this country thirteen years ago, and has lived here ever since. The patient sought admission into hospital for "diarrhœa," which complaint he has had on and off for the last year. He also gave a history of headache and vertigo, which have lasted for some considerable time. He further complained of weakness of both legs and hands. On examination, the man appeared to be of less than average intelligence. His memory was poor. He answered questions slowly. He was able to walk, but his gait was not steady. He moved slowly, with the legs wide apart, and dragging the feet along the ground. The knee-jerks were absent. The superficial reflexes were present. He had marked tenderness along the posterior nerve roots, in the lower dorsal and upper lumbar region. He was emaciated, and looked dull and stupid. He had an erythematous dermatitis on the dorsum of both hands, the dorsal surface of the right forearm up to the elbow, the dorsum of both feet, and the entire back of the left leg up the knee. The skin involved was cracked and wrinkled. The tongue was very raw looking, and was found denuded of its epithelium along the margins. The dorsum was found cracked and sore looking. There was also ulceration of the angles of the mouth. His appetite was fair. He had three or four liquid stools daily. He had marked œdema of both his legs and feet. The temperature was subnormal. The blood: a differential count proved as follows:—

Polymorphs ...	...	75·7 per cent.
Hyaline cells	...	13·09 "
Mononuclears	...	10·75 "
Eosinophils ...	...	0·46 "

Examination of stools and urine showed nothing of importance.

Notes of Progress:—

March 10, 1917. Has œdema of the lower limbs and abdomen. The dermatitis is quite healed up.

March 22, 1917. Has general anasarca.

March 26, 1917. Has erythema of the skin on dorsum of both feet up to the ankle. The skin is very tense and tough, almost leathery in appearance and feeling. The œdema is subsiding.

April 13, 1917. Patient is very loquacious; has delusions and loss of sleep.

April 16, 1917. Complains of headache and deafness.

April 19th, 1917. Patient is maniacal; complains of severe headache and has a voracious appetite; œdema almost subsided.

April 24, 1917. Patient is getting demented; has delusions of persecution (says that everyone about him is trying to hurt him).

May 4, 1917. Œdema entirely gone.

May 10, 1917. Patient is very quiet and well behaved. His appetite is still voracious.

May 22, 1917. The œdema has reappeared on the feet.

June 1, 1917. Patient complains of numbness of the feet and legs.

June 8, 1917. The œdema has extended to the legs.

June 28, 1917. The œdema has subsided.

July 20, 1917. Patient has increased in weight, the skin lesions have healed up; but the parts affected remain firm, pigmented and inelastic. On this date the patient left hospital apparently quite well both in mind and body.

This case is peculiar in that the patient evidenced the symptoms complex. He was, in fact, one of the two cases which showed a definite involvement of the mind.

Case 3.—L. F., a Chinese male, aged 50 years, was admitted to hospital, Taiping, on February 9, 1917. He was a mining coolie for some years, and lately he worked as a vegetable gardener at Kampar.

On admission he complained of diarrhœa of about two months duration, passing several liquid stools daily. He complained of thirst, and dryness of the mouth, occasional attacks of giddiness, and general weakness of the limbs. He had a symmetrical dermatitis on both hands and feet. The skin of the feet was cracked, swollen and ulcerated. The dermatitis on the hand extended from the wrist to the base of the second phalanges on the outer two-thirds of the dorsal surface of the hands. The cutaneous lesion on the feet involved the entire dorsal surface of both feet extending from the ankle to the base of the toes, and also the back of the heels, and the inner aspect of the feet. The tongue was very raw looking and the edges cracked. The angles of the mouth and the inner surfaces of the lips were ulcerated. He had tenderness along the spine, in the mid-dorsal region. His gait was unsteady. The knee-jerks were absent. He was dull and apathetic. He passed several stools with no blood or mucus. The skin lesions healed up while in hospital, but broke out again after some days. He died on May 4, 1917. Towards the end he developed œdema, which in time went on to general anasarca. Blood, stools and urine proved negative on examination.

Post-mortem Notes.—The body was emaciated. The heart was atrophied; the lungs a few patches of congestion here and there. The abdomen contained about a gallon of serous fluid. The liver was diminished in size, substance tough; the spleen was enlarged, the capsule thickened, substance tough; the kidneys were slightly cirrhotic; the suprarenal capsules showed thickening in the cortical area; the pancreas was cirrhotic; the intestines were atrophied, the mucous membrane was much thinned out; the brain, the pia mater was found much thickened over the two cerebral hemispheres particularly along the superior longitudinal sinus; and the cerebro-spinal fluid was found to be increased in amount.

Case 4.—C. On, a Chinese male, aged 35 years, was admitted to the District Hospital, Taiping, on October 6, 1917. He is a mining coolie and resides at Kamunting. On admission, patient complained of occasional attacks of vertigo, and headache, fullness of the stomach after meals, and diarrhœa; also weakness and numbness of legs and hands. He has had these symptoms for about six weeks. Two and a half months ago he had been ill with "dysentery," passing several liquid stools for about ten days. The patient is emaciated, has œdema of both feet and legs. Heart sounds feeble; lungs nil to note; abdomen slight amount of fluid present. Knee-jerks are absent, and the gait is unsteady. Has dermatitis on the dorsum of both hands, from the wrist down to the nail folds; also dermatitis on the dorsum of both feet, extending from the ankle to the base of the nails. The skin involved is thickened, leathery in consistence, and of a dark, slaty colour, and is separated from the healthy skin by a pinkish border which is irregular in outline. It is cracked and ulcerated in places. There is also an erythematous patch of skin on the manubrium sterni, and the back of the pinna of the right ear. The tongue is raw and clean, the edges are denuded of epithelium, presenting a serrated appearance. The buccal mucous membrane is seen ulcerated. There is marked tenderness along the scapular lines in the dorso-lumbar region of the spine. The bowels act two or three times daily. The patient remained in hospital for about a month; during which period he developed general anasarca, and died on November 8, 1917. Stools and urine showed nothing of note. The blood: a differential count was as follows:—

Polymorphs	...	...	66 per cent.
Small mononuclears	...	...	30·4 ,,
Large mononuclears	...	...	3·4 ,,
Eosinophils	...	...	0·2 ,,

Post-mortem Notes.—The body was ill-nourished. Heart; muscle was atrophied; lungs, nil to note; the abdomen contained three pints of serous fluid; liver, substance tough and congested; spleen, substance tough, capsule thickened; kidneys, nil to note; stomach and intestines, the mucous coat was atrophied; brain, the pia mater was thickened and very firmly adherent to the dura mater over the cerebral hemispheres in the middle and posterior thirds. There was an excess of cerebro-spinal fluid.

Case 5.—L. Ley, a Chinese male, aged 42 years, was admitted to the District Hospital at Taiping, on October 9, 1917. He is a mining coolie residing at Kamunting, in a Chinese mining kongsi. He came to this country twenty years ago from China, and has lived here ever since.

On admission, he complained of general weakness, and looseness of the bowels of three months duration, and giddiness. He had an erythematous dermatitis on the forearm and hands, extending from the elbow down to the metacarpo-phalangeal joints, and also on the legs from the lower third to the toes. The skin on the dorsum of the feet was raised in some places in the form of blisters. The tongue was raw and denuded of epithelium along the edges. The blood, stools, and urine proved negative on examination for parasites, &c. A differential count of the blood showed as follows:—

Polymorphs	...	...	57·39 per cent.
Large mononuclears	...	...	5·02 ,,
Small mononuclears	...	...	37 ,,
Eosinophils	...	...	0·30 ,,

He left the hospital after a week's stay on October 15, 1917, and was readmitted two months later with the following complaints.

Had chancre and bubo eleven years ago. Complains of soreness of the skin from the knee downwards, general weakness and numbness of the hands and legs, looseness of the bowels, passing four or five liquid stools, with no blood or mucus; headache, giddiness, and soreness of the mouth, and fullness of the stomach. Has had these complaints on and off for five months; the skin eruption only for twenty-eight days. Has desquamation and cracking of the skin on both legs extending from the lower third of both knees to the base of the toes. The epidermis is raised in blebs, which is surrounded by a raised pigmented border which sharply demarcates it from the healthy skin. The skin involved is thickened and pigmented. Has also desquamation of the epidermis on both forearms and dorsum of both hands. The skin here is less pigmented than on the legs, and the dermatitis extends from the lower third of the upper arms to the back of the digits. Has also slight pigmentation of the skin, on the back of the chest between the two scapulæ; also desquamation of the skin on the right cheek. Tongue very clean and strawberry in appearance. Has ulceration of the angles of the mouth and the buccal mucous membrane. Passes liquid stools four or five times daily. Gait is unsteady, and ataxic in character. Knee-jerks are absent. Has tenderness in the lumbar region of the spine and also in the upper dorsal region. Has loss of sensation of touch on both feet below the ankles. The urine and stools were negative on examination. A differential count of the blood proved as follows:—

Polymorphs	...	...	70 per cent.
Large mononuclears	...	...	13 ,,
Small mononuclears	...	...	13 ,,

Examination for Wassermann reaction was negative

A record of the weight was as follows:—

On	December	12, 1917,	8	stone,	4 lbs.
On	December	19, 1917,	8	,,	8½ ,,
On	December	26, 1917,	8	,,	10 ,,
On	February	2, 1918,	9	,,	8 ,,
On	February	9, 1818,	9	,,	9 ,,
On	February	28, 1918,	10	,,	2 ,,
On	March	13, 1918,	10	,,	4 ,,
On	April	3, 1918,	10	,,	9 ,,

Progress Notes :—

December 6, 1917. Skin lesions healing. Complains of severe pains in the abdomen and passes several stools.

December 12, 1917. Complains of burning sensation in both legs and feet and weakness of the legs.

December 22, 1917. Tongue condition is better.

January 5, 1918. Complains of numbness and weakness of the legs.

January 21, 1918. Skin getting more pigmented on the affected area. On this date patient was given an injection of N.A.B.

January 31, 1918. Tongue almost normal. Skin lesions healing. Diarrhœa is better.

March 20, 1918. Patient has put on weight. Appears much improved. Skin lesions healed up but the affected area remains thickened, inelastic and pigmented.

A CASE OF UNUSUAL CONGENITAL DEFECT.

By W. A. Young, M.B., Ch.B., D.T.M.Liv.
AND
E. J. Wright, M.R.C.S.Eng., D.T.M.Liv.
Medical Officers, Colonial Hospital, Freetown.

Mrs. M—— A——, a multipara, aged 36 years, was admitted to the Maternity Ward of the Colonial Hospital on February 5, 1918, in order to be delivered. She was a Timnee, but spent most of her life in Freetown.

Shortly after admission she developed pyrexia, the cause of which was found to be the subtertian parasite of malaria. She was accordingly treated with quinine.

In the evening she gave birth to a living child without any difficulty—vertex presentation. Half an hour later a second child was delivered, as a breech, after rupturing a very tough bag of membranes. The children were both females, both living, and had a common placenta. The elder child had a congenital defect in its abdominal wall, through which protruded a lobe of the liver, and a mass which appeared to consist mainly of intestine. This baby had an oldish appearance, and the skin was loose and wrinkled. She lived for eighteen hours, during which time milk was taken and meconium passed.

Previous History of Mother.—Past history is very difficult to get, and when obtained is not always reliable. The mother has been fairly healthy up to date. The bridge of her nose is depressed and she is very prognathous. By her first husband she had a child, a girl, who died of convulsions when 2 years old. " Convulsions " is a very vague term, and may include malaria, ascariasis, syphilis, and intestinal disorders. She now left her first husband, and by the second gave birth to the following children: A boy, aged 16 years (living); boy, aged 12 years (living); a boy, aged 8 (living); a girl, died when 9 months; a boy, about 5 years (living); a boy, about three years (living); and then the twins under discussion now. As far as one can find out she has had no miscarriages, but her sexual relations have been somewhat casual. She had her first child when 16 years old. The second twin is still alive, but at the age of a month only weighs 5¼ lb.

Post-mortem Examination.—The child was poorly developed. The face was that of an old man. The skin was loose and wrinkled. The weight was 3¼ lb. There was a total lack of the anterior abdominal wall on the left side of the shape of an ellipse about 2⅗ in. by 3½ in., long axis vertical, the mid-point of which was situated at the junction of the middle and outer thirds of a line joining the umbilicus to the mid-axillary line. The skin grew round the edge of this opening and blended with the peritoneum. Extruded through this opening was the left lobe of the liver, the stomach, and what proved after dissection to be the whole of the intestine, except the rectum. The liver weighed 6½ oz., which for a baby of 3¼ lb. was almost twice the usual weight. All the other organs were correctly placed and apparently normal. The thymus gland was well developed. On the right side, and corresponding roughly to the centre of the opening on the left, the abdominal wall bulged, and was darker in colour. (*Vide* Photo 1.) Here also there was deficiency of muscular tissue, and internally the peritoneum was absent to the extent of the area covered by a penny-piece.

Treponema pallidum was found abundantly in the liver. The recti abdominis muscles were present, but very poorly developed.

Of six photographs sent one only is here shown. The protrusion on the left side and the bulging on the right side are to be seen.

[This is a rare if not a unique defect of the abdominal wall. The presence of the recti muscles of the abdomen is peculiar, seeing that they are developed in the lateral closure of the abdomen, and not by a vertical development.—Editor, Journal of Tropical Medicine and Hygiene.]

Does Irritant Action of Emetine Hydrochloride extend to Kidney? (D. de la Paz and R. Montenegro, *Philippine Journal of Science*, January, 1918).—Experiments were made on dogs to determine the irritant effect of emetine hydrochloride on the kidneys and other remote organs. The results show that emetine hydrochloride gave rise to congestion and slight parenchymatous degeneration of the kidneys. While in one dog the drug produced hæmorrhages at the sites of injection and between the layers of the renal capsule, and at the site of injection in another dog, in no case did its irritant action extend to the parenchyma of the kidneys, although it was administered in a quantity that, when injected daily, eventually caused the death of the animals.

CASE 3.—L. F., a Chinese male, aged 50

CASE 5.—A Chinese male, aged 42.

To illustrate paper, "Pellagra," by A. VISWALINGHAM, L.M.S.

To illustrate paper, "A Case of Unusual Congenital Defect," by W. A. Young, M.B., Ch.B., D.T.M.Liv., and E. J. WRIGHT, M.R.C.S.Eng., D.T.M.Liv.

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THE JOURNAL OF

Tropical Medicine and Hygiene

AUGUST 1, 1918.

THE ARMY CALL FOR MEN BETWEEN 40 AND 50.

WHILST the middle-aged manhood of the nation is being called to the Army, an excellent opportunity of reviewing the state of health and physique of men between the ages of 40 and 50 is provided.

The men the writer has had to deal with are mostly town dwellers, but not altogether; nor are they wholly confined to men born in the British Isles. It would appear from general reports that the physical condition of men in the forties is giving a great deal of disappointment and some concern to the more thoughtful observers that all is not well with the race.

Of course, it must be remembered that it is almost always men with something wrong with them that come or are sent to the civil practitioners for an opinion as to fitness; but as a number of these men are graded 1, the examining authorities must think highly of their physique to place them in the highest group of all. In looking at the matter closely it is necessary to remember that it is the *history* of men over 40 that is the important point; with younger men it is merely the childish or boyhood ailments that have to be inquired into, and as a rule a few questions settles that matter; but with middle-aged men it is different; they have almost invariably a history to give of their various ailments; that history takes time to tell and to unravel and to gauge correctly. There is no time allowed for such a purpose. The history of the ease is the important thing in all hospital patients; without it we are apt to fall into error and to misinterpret clinical evidence. It is part, an important part, of the training of medical men to carefully inquire into the previous illnesses of the patients they have to deal with, and every man in the forties, and certainly after 45 years of age, has a record to unfold. The man of that age who says he never had a day's illness in his life is, as a rule, not speaking the truth. He will positively state he has had no serious illness; for everything short of a fatal malady is evidently by the public regarded as not serious.

Yet how often are we misled. The man before a medical board who says he has had a pain in his back is apt to be considered as one who is merely announcing "calling up" pains, whereas were he allowed to proceed is might be, and often is, an indication of true renal colic. That which is often styled lumbago, the commonest of ailments, may truly mean a renal calculus. The man who complains that he is often troubled with "biliousness" is apt also to be put down as a chronic alcoholic; but were careful attention given and the matter inquired into, it would be found that the giddiness, the tottering walk, the vertigo, vomiting, and pallor was part and parcel of the symptoms of Ménière's disease. These examples could be multiplied, and none are more willing to agree with these statements than the members of the medical board themselves. It is impossible to examine men in middle age at the same rate as in the case of younger men. By middle age every man has, as it were, laid the seeds of the disease which is to afflict his more advanced years, and it is the "history" of the case that alone can prevent mistakes. There ought to be a separate standard of time allowed for older men, or it should be made a rule that a history of the case and an *interpretation* of the aches and pains be brought with the candidate to the medical board. A mere account that the doctor had attended Mr. So-and-so for this or that ache or pain, for

rheumatism, for lumbago, for headache, for biliousness, is quite beside the mark without an interpretation—that is, a probable or positive statement of the cause of these more or less indefinite symptoms. This would serve to avoid error, to check the popular hue and cry being made against the members of the medical board—a quite unjustifiable accusation. It is not the medical men who are at fault, but the system, as usual, which strangles efficiency and accuracy. There is nothing wrong with the system in the ideal, but in the practical sphere only, for it is impossible to gauge the physical state of any middle-aged man without a clinical history carefully and systematically gone into by accurate clinicians. For, as stated above, it is the history, and it cannot be repeated too often, that it *is* the history, and nothing but the history, by which errors can be avoided. In the apparently healthy middle-aged man the ailment which is to prove his undoing is, as a rule, in but its initial stage, and has not yet declared itself; it has not yet attained the definite status of a disease, but only the embryonic stage of the pathological change which is more or less quickly to declare itself.

Under certain circumstances this pathological process may be hastened by unwise behaviour on the part of the individual—either want of exercise, or, on the other hand, undue exercise may hasten the development. To put a man who has reached middle age to work he has not been accustomed to, in unaccustomed surroundings or environment, may be good for him if conducted wisely, or, on the other hand, it may lead to untoward results. This takes time to consider, but time is the one thing not available at medical boards, and the medical men are thereby set at a disadvantage, and the candidate's life placed in jeopardy owing to this removable cause.

That pains are not taken by the medical board we do not for a moment suggest, but they have to deal with what clinical evidences are discernible in a few minutes. Times are altered in the matter of examining recruits; they used to be cast for the Army for bad teeth, for varicose veins, for hernia, for varicocele, for retained testicles, for congenital troubles of sorts; but all that is changed. None of these are considered nowadays as wholly detrimental or even to prevent a man, unless these are exaggerated, from being accepted as Grade I. But these were in the pre-war days when recruits were plentiful; but to-day it is wholly different, and especially is it the case with the middle-aged men in whom some form of ailment of a more or less chronic nature has all too often set its stamp, although clinically it presents what seems to be a mere ephemeral ailment of sorts.

Another point of note is that in few men of 45 does the heart present the normal limits given in text-books. It is but very rare to find a man of middle age whose apex beat is to be met with in the "text-book position." In 90 per cent. of these men the apex beat reaches a point close to, immediately upon, or, and this very often, it is beyond the left of a line drawn vertically downwards from the left nipple. It is very rare to find a man of this age in whom a bruit is not heard over the aorta when the arms are raised to the level of, or above the level of, the shoulders. Is this man fit for Grade I? A man, of the age specified, examined whilst standing still, may manifest nothing much amiss until he is given some exercise, say, swinging the arms twelve times around the head; then are troubles made evident, a tachycardia it may be, a dilatation proceeding beyond normal limits, a bruit here or there, an intermittent or irregular action of the heart. Yet this man when at rest, when performing his ordinary machine-like daily employment, may present nothing amiss; but give him some other work to do, to march a given distance, to shoulder a pack, to carry a wounded man on a stretcher, &c., then, and then only, is he made aware of his incapacity, and his unfitness becomes apparent, and the rest of his time is spent in hospital in the hope of his recovery—a hope that never has been, and never will be, realized.

Old Tropical residents who are called up, men who, yet in the forties, have had to give up the Tropics for some persistent ailment, be it intestinal, cardiac, or stomachic, are seldom fit for any form of *continuous* National service, be it physical or sedentery, for they have seldom the stamina to fulfil their obligations and duties.

Latent colitis or dysentery, latent hepatic ailments, a spleen not yet reduced to normal size, a malaria masked by quinine, are ever ready to declare themselves under adverse circumstances, which may be continued exertion, fatigue, chill, wet clothing, exposure, or, on the other hand, very hot weather, and the recurrence of the spring or autumn recrudescences of malaria. Each and all of these are not to hand in the case of younger recruits, but in those older who have been for a time in the Tropics. Yet the medical men on the board may say "Oh, malaria; that's nothing. I had it once myself when on a voyage to the East"; or as occurred to a Frenchman resident in England who had been soldiering for three years in Upper Tonkin, on stating he had malaria there, he was told that "Tonkin is a healthy place; you could not get malaria there." Where this savant thought Tonkin was is not told; but if he can find a man who has done a period of campaigning in Tonkin without contracting malaria, he would have a rare discovery to his credit indeed.

In all, therefore, it may be said the question of the fitness of middle-aged men is a difficult one indeed. The history of the man's ailment is everything; by it, and by it alone, can the question of fitness be scientifically established. The gouty man, the man who has had calculi, who has dilated his heart by strenuous swimming, cycle racing, or rowing in his younger days, or who has had albuminuria at any time, presents problems of fitness or unfitness which cannot be settled in a few minutes by a stethoscope placed over the heart when the candidate is at rest or by a few questions, to which the candidate mentions lumbago or sciatica as the

symptoms which he is conscious of, but of the reason for which he has never given a thought and does not know. The system is wrong. Give the medical men more time; do not hamper them by the semi-piece-time work under which they labour; for so many must be got through in a given time, or there is trouble ahead. Clinical medicine is not to be hurried; it is impossible to place a time-limit to its work, and expect it to be satisfactory. The problems of medicine are to be settled only by laboured exactitude nowadays; they cannot be scrambled through haphazard and expected to be even approximately correct. By such methods the State suffers, the military hospitals are filled, the stools in the business offices emptied, the reputation of medical men besmirched, and the defeat of the enemy delayed or placed in doubt.

Annotations.

Transfusion in Measles (L. Ribadeau-Dumas and E. Brissaud, *Bulletin de la Société Médicale des Hôpitaux*, February 15).—Two Arabs were brought to the base hospital with extreme collapse in the course of measles. One speedily died, but the other recovered after transfusion of citrated blood from a measles convalescent. The eruption was diffuse and ecchymotic, the fever up to 41° C., with collapse, anuria, incontinence, and toxic dyspnœa. After transfusion of 100 c.c. of blood from a man who had been cured of measles for a week, in two hours the vital functions had recuperated and speedy recovery followed.

Epidemic Meningitis at Palermo (G. Di Cristina and M. Sindoni, *Pediatria*, April).—At Palermo last year there was a predominance of extremely toxic cases and of relapses, flaring up of latent infection into the acute form, and protracted forms, the fever dragging along as if maintained by some suppurative process. Notwithstanding free application of serotherapy, the mortality was over 54 per cent. in nurslings. The meningococci responsible for the tardy relapses and flare-ups seemed to be the same as at first, having regained their virulence after it had been for a time attenuated under the influence of the serotherapy. They had lost their agglutinating property, however, and had become resistant to the action of the anti-serum. In fifty cases of the epidemic meningitis, sixteen developed these severe recurrences or relapses when the disease seemed to have been entirely conquered and the patients had apparently recovered or were convalescing. At first all those affected died. Serotherapy at this stage seemed to be futile, and induced symptoms suggesting anaphylaxis even when this could not have been the case. Vaccine therapy by the intravenous route was adopted; the mortality dropped from 98 to 16·5 per cent. The fever declined and disappeared, and both the general and local symptoms subsided and the spinal fluid cleared up.

Amœbic Dysentery.—T. Bayma (*Annales Paulista*) in July, 1915, reported the systematic use of epinephrin in amœbic dysentery, in amœbic liver disease, and in appendicitis. Epinephrin has certain advantages over emetine for treatment of amœbic dysentery, and experience indicates that the amœba is eradicated by it and does not pass into the encysted form. The epinephrin further has an important action on the suprarenalitis which has lately been demonstrated to be part of the clinical picture of amœic dysentery. Emetine and also the biniodide of bismuth and emetine have a more or less depressing action in amœbic dysentery, directly aggravating the depression, weak pulse, and tendency to syncope which reveal insufficiency on the part of the suprarenals. Epinephrin, on the other hand, suppresses the distressing colic and tenesmus, toning up the general system by its angiotonic and antitoxic action. The epinephrin can be given by the mouth up to 3 or 5 mg. a day without appreciably raising the blood-pressure. Patients treated with epinephrin over two years ago have remained in the best of health with nothing to indicate persisting infection with the amœba, and with nothing to suggest injury to the arteries or other organs from by-effects of the epinephrin. Only when the epinephrin is given by intravenous or intratracheal injection is there danger of by-effects.

Symptoms following the taking of Quinine (G. R. Footner, *Lancet*, July 8).—The patient, a young married lady, eleven years resident in British East Africa, had never suffered from malaria, though often exposed to infection. She had taken quinine twice. The first time a dose of 10 gr. by the mouth produced shortness of breath, œdema of eyelids, and urticaria. The second time similar but milder symptoms followed taking a drachm of Easton's syrup.

She had a severe attack of malaria on December 24, 1917, in the Sudan, and was given, unknown to her, 5 gr. of quinine. Great shortness of breath, œdema of eyelids, and urticaria followed. Four grains were given by rectum; same result. After this no more quinine; fever slowly subsided. On the day after first dose of quinine (December 24) uterine hæmorrhage began, and continued till January 4, 1918.

On January 3 no fever, no malarial parasites found in blood. After calcium chloride in daily dose of 30 gr. for two days quinine was given in ½-gr. doses three times a day for twenty-four hours, and 1-gr. doses three times a day for forty-eight hours. After this two doses of 2 gr. each produced dyspnœa and itching of hands and feet. Amount reduced to 1 gr. thrice daily; fever recurred; subtertian parasites found. After 30 gr. of calcium chloride, ½-gr. doses of quinine were used hourly for ten doses, followed by 1 gr. hourly for four doses. This produced nausea, and three intramuscular injections, each of 7½ gr., were given in twenty-four hours. An urticarial rash appeared after second injection; no other bad effects.

Temperature now became normal and blood free of parasites. Before leaving Khartoum patient was taking 2 gr. of quinine thrice daily, and received an intramuscular injection of 15 gr. with no ill-effects.

She was susceptible to the pollen of "black wattle," a kind of acacia found in British East Africa, but in England had never had "hay fever." Proximity to horses did not produce symptoms, and no other members of her family suffered. The symptoms were on all occasions witnessed by a doctor. The salt used was quinine bihydrochloride.

Intermittent Fever with Meningococcus Septicæmia (A Netter, *Archives de Médecine des Enfants*, May).—Meningococcus infection may assume the type of a regular daily or tertian intermittent fever. It is often accompanied by eruptions, a nodular or polymorphous erythema or purpura, and one or two months or more may elapse before the cerebrospinal meningitis develops. Sometimes meningitis never develops. Bacteriologic examination of the blood clears up the diagnosis when the spinal fluid gives negative findings. The intermittent febrile attacks yield promptly to proper serotherapy, preferably polyvalent treatment. Intravenus injection may induce alarming reactions even at the first injection, so that the intraspinal route is preferable.

A boy of 15 had febrile paroxysms irregularly morning or afternoon, every day or third day. In the intervals he did not seem sick. This was the rule also in similar cases in infants and others on record. Chill, fever, and enlargement of the spleen were sometimes accompanied by joint symptoms, but the eruptive manifestations pointed to meningococcus infection rather than to malaria in one of his five cases. In a case reported the diagnosis had been successively malaria, Addison's disease, tuberculosis, Malta fever, septicæmia, and febrile syphilis. No signs of meningitis were apparent until the eighty-first day. No meningococci were found in the spinal fluid until a day or two later. Serotherapy then promptly restored the patient to health after months of futile other measures.

Acute Meningitis in Inherited Syphilis (V. Hutine, *Presse Médicale*, April 18).—In children between 3 and 15 meningitis develops on a basis of inherited syphilis; like the meningitis in adults from acquired syphilis. In the first few weeks of life the specific meningitis is part of the grave general septicæmic disease, but after the age of 2 there is not so much acute meningitis as the rearousing of old reactions on the part of the meninges to some casual infection acting on the already damaged nerve cells. The reaction may simulate tuberculous meningitis or it may be insidious and latent. Inherited syphilis should be suspected when the meningitis does not present the classical picture of ordinary meningitis and suspicious stigmata suggest possible syphilis, but the convincing proof is the recovery under specific treatment. Even when everything seems to suggest true tuberculous meningitis, he waits before informing the family until after a course of specific treatment. This does no harm in the tuberculous form, while there is always a possibility that syphilis may be responsible for the meningitis, and that it may subside under treatment. The signs and symptoms of the meningeal relapses in inherited syphilis are those of any acute meningitis; convulsions are frequent. The spinal fluid may show the findings common in tuberculous meningitis, or the lymphocytes may be replaced by medium or large mononuclears or polynuclears, and the cell count may vary rapidly. Spirochætes are not generally found in the fluid, and the Wassermann reaction is often negative. In about half the cases a positive Wassermann in blood and spinal fluid is not obtained until after recovery.

Dyspepsia in Men Returning from German Prison Camps (F. Raymond and A. Petit, *Bulletin de la Société Médicale des Hôpitaux*, February 18).—Of forty men repatriated after long imprisonment in Germany, practically all were suffering from acute or subacute gastro-enteritis, the condition much like those in herbivora kept on a meat diet. The corroboratory evidence of all shows that the diet at the Würzburg, Darmstadt, and Gräfenburg camps consisted of bread containing bran, straw, potato, corn and sawdust, barley coffee, no sugar, bean or turnip soup, and at supper 40 grm. of cheese of the Brie type or a piece of sausage the size of one's thumb, or herring. They comment that "the Germans have no excuse for these scanty rations, for the potato harvest in 1917 was particularly good, and the stock of pigs was never so large. The Austrians, on the other hand, although with greater scarcity of food-stuffs, yet have made a point of respecting the international conventions which they had signed." Among the repatriated from Germany whom they examined, fully 10 per cent. had confirmed gastric ulcer; four required an operation for stenosis of the pylorus.

These gastric disturbances are not the only ones nor the most frequent. There is the long, sad train of those with advanced consumption. What the shells and the poison gases fail to accomplish, the prison camps complete. We witness thus the slow and implacable death agony of all our young men, without a single word of protest being raised. And while our sons are perishing obscurely in the gaols and camps of Germany, France always foolishly generous, does not reciprocate. Our German prisoners have abundant food, which they can vary; they enjoy excellent health. When the War is over they will take up again the economic struggle, with all their forces intact, and it will not be our soldiers returning anæmic from Germany, in greatly diminished numbers, who will be able to crown the victory of our arms with the economic victory.

Abstract.

TRICHINOSIS.[1]

By J. Meyer.

The following cases are reported because of the definite meningeal symptoms, the changes in the spinal fluid, and the difficulties encountered in early diagnosis.

At the hospital all patients enter the receiving ward, where an examining physician makes a diagnosis. The patient is then sent to the proper ward. In the three cases herein reported the patients entered the contagious disease hospital January 4, 1918, with an examining-room diagnosis of epidemic meningitis. The three are members of the same family. No history was obtainable, except from the oldest girl, who is about 12 years of age.

Report of Cases.

Case 1.—S. P., girl, aged 6, six days ill with headache and vomiting. There was no diarrhœa and no abdominal distress. The patient, an Italian child, was brought to the ward in an irrational state. The striking feature of the case was marked irritability, in spite of which the child responded when told to show her teeth, put out her tongue, &c. There was a marked œdema of both upper eyelids. The temperature on admission was 100·1° F., the pulse was 112, and the respiration 24. There was a definite rigidity of the neck, and when the child was lifted by the head she cried. Photophobia was present. There were a few crusts on the nose, but no herpes on the lips. The heart and lungs were normal. There was no tenderness, but an uncertain degree of general rigidity about the abdomen. The liver was negative, and the spleen was not palpable. There was tenderness over the extremities. The Kernig sign was strongly positive. The knee-jerks were absent. The spinal fluid was under increased pressure, was clear, and showed fifty-eight cells per cubic millimetre. The presence of lymphocytes was observed, but there were no organisms. On the basis of these findings a diagnosis was made as follows: The clinical manifestations of the patient pointed to a definite meningitis. The character of the spinal fluid, together with the absence of knee-jerks, pointed to a poliomyelitis, although there was no evidence of paralysis.

The next day the child was extremely sick. Her temperature was 103° F., and her pulse 96. The Brudzinski and the Kernig signs were positive. There was an œdema of the legs and the eyes, as well as marked tenderness over the extremities, particularly over the right elbow when held in a position of flexion. The blood count revealed a leukocytosis of 8,000, and an eosinophilia of 10 per cent. Spinal puncture was repeated and revealed fifty cells which were lymphocytes. The fluid was under increased pressure. Trichinæ were found, two or three in a field. A section of muscle removed from the biceps on the same day showed unencapsulated trichinæ. Blood was removed January 10, 1918, from a vein in the elbow, and examination was delayed until January 14, 1918. Many trichina larvæ were found. The blood count, January 11, revealed a leukocytosis of 11,000 and an eosinophilia of 8 per cent. As the patient was observed, the œdema of the eyelids and the legs grew less, and muscular tenderness was definitely localized; but stiffness of the neck persisted.

Case 2.—D. P., boy, aged 8, who had been sick four days, was admitted to the hospital January 4, 1918. He was a brother of the child described in the foregoing. He was unable to rise and looked sick. His face was swollen, particularly about the eyelids. His older sister said he had been sick for four days with headache and vomiting. The temperature on admission was 101·8° F., pulse 110, and respiration 28. The head was large and square. There was a marked œdema of the upper eyelids, particularly of the left, which almost closed the eye. There was a herpetic sore on the upper lip. The throat was congested. The heart and the lungs were normal. The abdomen was not tender, but there was a degree of general rigidity present. Neither the liver or the spleen was palpable. In both axillæ there were numerous small pinpoint hyperæmic spots, which tended to fade on pressure. Both the upper and the lower extremities were tender to touch. There was an infected vaccination mark over the left upper extremity. The Kernig sign was strongly positive and the knee-jerks exaggerated. The Babinski reflex was doubtful. A spinal puncture was made, and the spinal fluid was under increased pressure, being clear and showing fifty cells per cubic millimetre. The presence of lymphocytes was observed. A diagnosis, as in the former case, was made as follows: The physical findings were very suggestive of a meningeal inflammation or irritation, but the etiologic factor was uncertain. Vigorous catharsis was then ordered. Two days later the patient had definite soreness of of the muscles and œdema of the legs and the eyes. The blood count revealed a leukocytosis of 30,000 and eosinophilia of 50 per cent. Repeated blood counts revealed a leukocytosis of 15,000 and an eosinophilia of 24 per cent. The boy improved rapidly. Another special puncture was made two days after admission, but was bloody (traumatic). The blood was examined for trichinæ, but none were found. No examination of the muscle was made.

Case 3.—T. P., girl, aged 12, was the oldest of the three children brought to the ward with a diagnosis of meningitis. She said she had been sick for about two days, complaining only of headache and stiffness of the neck. There was no other history. She did not appear very sick. The temperature was 100·8° F., and the pulse 88. The head was negative, and eyes were watery as if she had been crying. Both eyelids were swollen and œdematous. There was no photophobia. Herpes were present on upper lip. There was a small amount of rigidity of the muscle of the neck, which was apparently not voluntary. The heart and the

[1] Abstracted from the *Journ. Amer. Med. Assoc.*, March 2, 1918.

lungs were apparently normal. The abdomen revealed a slight tenderness in the region of the spleen, but the spleen was not palpable. There was a slight rigidity of the abdomen. There was no pain or tenderness over the extremities, except in the left elbow joint, but it was difficult to localize pain definitely. No evidence of any paralysis was discovered.

The Kernig sign was positive, both knee-jerks were absent. Forty c.c. of the spinal fluid were removed. It was under increased pressure, was clear, and showed 240 cells per cubic millimetre, and lymphocytes.

The findings present were suggestive of a meningitis. The character of the spinal fluid, on the contrary, suggested poliomyelitis, which diagnosis was further supported by the absence of knee-jerks and pain in the region of the elbow.

January 5, 1918, there was no change. The Kernig sign was positive. The throat was congested. The skin of the abdomen revealed a few red pinpoint areas, not petechial, and unlike rose spots, which fade on pressure. There was pain in the region of the elbow anteriorly and not over the joint. The rigidity of the neck was only moderate.

January 6, there was headache with pain in the legs, arms, and back. The patient had difficulty in sitting up and in elevating the right arm. There was no evidence of paralysis. Knee-jerks were now present, but were hard to elicit. The Kernig sign persisted. The blood count revealed a leukocytosis of 10,800 and an eosinophilia of 8 per cent.

January 7, the patient was very sick, with a temperature of 103° F. and a pulse of 110. A spinal puncture was made. The spinal fluid was under increased pressure, and the first portion was bloody. When it was examined actively motile trichinæ were found.

January 11, the spinal puncture was repeated. The fluid was clear, was under increased pressure, and showed eighty cells per cubic millimetre, as well as the presence of lymphocytes. Trichina larvæ were present. The Nonne reaction was positive and the Ross-Jones test negative. The Haines solution was reduced. The nitric acid test for albumin was negative. The biceps muscle was harpooned, and actively motile trichinæ were found. The blood examination was made according to Herrick and Janeway technique, and numerous trichinæ were found.

No history of the eating of ham, pork, or pork sausage was elicited from the children or parents. Subsequently the mother was admitted to the medical ward of the hospital and gave a good diarrhœal history, but no trichinæ were found in the muscles.

Comment.

The spinal fluid was clear and under increased pressure. The cell count was as high as 240 and as low as 40 per cubic millimetre. The Nonne reaction was positive, the Ross-Jones test was negative, and Haines solution was reduced. The nitric acid test for albumin was negative. This is definite evidence of meningeal irritation. That the meningeal symptoms are very likely due to meningeal irritation is in accord with definite changes in the spinal fluid, so that two of the cases might be called meningitis due to trichina. While it is true that a Kernig sign may be due to muscular swelling and œdema, nevertheless the Kernig sign in these cases was present before the œdema developed. The œdema noted was not similar to the ordinary type, which pits on pressure, but was rather hard, glistening and board-like, particularly over the extremities. Granting a false Kernig sign, on what basis other than meningeal irritation are we to explain the stiff neck, the suggestive Brudzinski's sign, the exaggerated knee-jerk (in one case), and the headache and vomiting, unless the cause could possibly be the toxæmia? But toxæmia cannot account for the cellular change in the spinal fluid.

It is necessary to differentiate these early cases with meningeal symptoms from poliomyelitis. In children marked weakness of the limbs is present, and one case in a child of 8 years locomotion was difficult because of the great prostration. In Case 2 the patient was unable to arise on the examining-room table and stand, unless supported. In the other two cases the patellar reflexes were absent. In addition, tenderness was present over the extremities, and patients complained of pain on pressure. In children it is at times difficult to determine whether one is dealing with a perineuritis or a myositis, as the pain response is very readily obtained. When, in addition to these factors, a physician examines the spinal fluid, and finds it clear, under increased pressure, and observes a cell count ranging from 240 to 40, he may justly suspect poliomyelitis in the absence of any evidence of paralysis. The diagnosis of trichinosis, however, is established by the occurrences of œdema, the presence of an eosinophilia in the blood picture, and the isolation of the trichinæ from the spinal fluid or muscle.

The high eosinophilia of 50 per cent. in Case 2, and the comparatively low eosinophilia in the other two children, who were extremely ill, is in accord with the observations that the more severe the infection the lower the eosinophilia, and vice versa.

In Case 3 the patient, who was the oldest of the three, developed an urticaria. By many physicians urticaria is considered an anaphylactic reaction. It is known that in the post-anaphylactic stage there is an increase in eosinophilia. Accordingly, a differential count was made when the urticaria first appeared, and was found to be 12 per cent. Twenty-four hours later it was 10 per cent.

Summary.

(1) Trichinæ in the spinal fluid in two cases produced definite clinical symptoms of meningitis.

(2) The spinal fluid in trichinosis, in addition to the trichinæ, showed an increase in lymphocytes, from 240 to 40 per cubic millimetre, reduced the Haines solution, and gave a positive Ross-Jones test.

(3) Trichinosis with meningeal irritation must be differentiated from poliomyelitis.

Original Communications.

SOME OBSERVATIONS ON THE NATURE AND TREATMENT OF MALIGNANT MALARIA IN EAST AFRICA.

By MAURICE ROCHE, M.C., M.B., B.Ch.
Captain, I.M.S.

IT is thought that it may be useful to describe some experiences of this disease, had during a long period of active service in East Africa, in the hope that others may be stimulated to make, when more favourable circumstances permit, further investigations along certain directions, suggestions for which are submitted below.

Malaria is a disease peculiar, if not unique, in that both its prevention and cure are sought after by the same medium, viz., quinine. It is the non-recognition of these two closely connected, but nevertheless separate, uses of quinine that, particularly in the layman's mind in the Tropics, causes so much confusion about the varieties of doses and various methods of administering this drug.

In East Africa, in field hospitals, every patient, whatever his disease, should get 5 gr. of quinine, in some form or other, every evening, in addition to his other treatment, until he can be removed to a non-malarious district. This is an important point, but is often neglected, with results both unfavourable and confusing. Confusing because, where prophylactic quinine is not also given, if later attacks occur it cannot be ascertained whether they are due to inefficiency of treatment or to fresh infections not being prevented.

Prophylactic quinine is often ordered to be taken in doses varying from 10 to 20 or even 30 gr. In a kind of dream it is taken almost invariably in the morning "with the porridge." After some time one gets "fed up" with quinine, since it is the cause of mild deafness and the suspected origin of every minor ailment, and sooner or later one neglects, often surreptitiously, to take any quinine at all, and then infection ensues. Whereas the small dose of one 5-gr. tablet can be, and is, taken month after month every *evening* without any ill-effects whatever, and, as has been substantiated elsewhere,[1] is successful in preventing malarial attacks in even the worst climates. In such places, if no prophylactic quinine is taken, the new-comer is attacked about twelve days after arrival. If prophylactic quinine is taken in the mornings or irregularly the attack is generally delayed, but, in really bad localities, takes place almost invariably within a month of arrival.

It is proposed to deal with the subject under the following headings:—

(1) Usual course of an attack.
(2) Experience of attacks in (*a*) troops, (*b*) the writer.
(3) Suggested plan for radical treatment.
(4) Cerebral malaria: symptoms, treatment, theories.
(5) Blackwater.
(6) Conclusions.

[1] *Indian Medical Gazette*, October, 1917.

USUAL COURSE OF AN ATTACK.

The first attack is usually severe. The temperature rises rapidly to between 105° and 106° F., with often severe headache, backache, and vomiting. A small dose of calomel is generally given early. Then aspirin, in one or two doses of 10 gr. each, is given while the temperature is rising, both to relieve the headache and to induce early sweating. Bayer's aspirin, of which we had a fair amount in German East Africa, is here invaluable. One or two drachms of mag. sulph. solution are given at the height of the temperature. This mildly irritates and congests the alimentary mucous membrane, and this seems to accelerate the absorption of any oral quinine given subsequently. Soon after the commencement of perspiration quinine is given in some form or other. The temperature falls, and the patient becomes comfortable about six hours after onset of attack. His soaked clothing must be removed and dry pyjamas put on. He falls to sleep, and wakes up, say, next morning feeling much better. The temperature remains about normal all this day, unless the infection is a double one—an unusual occurrence in the first attack. On the third day, however, the temperature rises again to, say, 104° F., falls, and remains normal from the fourth day onwards. This secondary rise is seldom prevented by even large doses of quinine given by the mouth. If quinine is now improperly given relapses occur, the first after an interval of about ten days. This interval, however, depends upon the sufficiency of the quinine treatment and upon considerations of fatigue and cold, especially when patients have to return to work too soon. Inadequate treatment leads to constant relapses, i.e., chronic malaria.

CHRONIC MALARIA.

Relapses tend to recur when resistance is lowered by any cause, such as fatigue after a long trying march in the sun, chill after a wetting, chills on being sent to the "hills" for convalescence, at parturition, and on the occurrence of other diseases, such as typhoid.

Sometimes these relapses can be intelligently anticipated and diminished in severity, if not altogether avoided, by taking quinine. True cases of abdominal malaria have never been seen by the writer. Two cases diagnosed as such turned out to be appendicitis in one instance, and typhoid in the other. The diagnosis was obscured in each case by the occurrence of true malarial fever at the commencement of the more serious disease. Relapsing fever is easily diagnosed microscopically. The spirilla are readily seen if the blood-film is taken at the height of the fever. In the absence of a microscope the diagnosis is difficult, though assist-

ance may be obtained from the fact that in relapsing fever the temperature remains up for thirty-six to forty-eight hours, the tongue tends to be brown and dry, and the relapses recur with remarkable regularity about the fourteenth day.

EXPERIENCE: (A) TROOPS.

For twelve months during 1914-1915 the men of an Indian regiment were scattered about in small groups in various parts of East Africa, and were all infected with malaria. When later these men were collected and stationed together for several months during 1915-1916 there was time and opportunity for carefully observing the effects of different methods of treatment.

It was found that the oral administration of quinine was unsatisfactory. No matter what method or routine was adopted, quinine given by the mouth failed to prevent secondary rises and relapses. Also when given thus during the attack it often induced vomiting, which in turn greatly aggravated the patient's headache and general discomfort. So treatment by injections was resorted to, and, after some little time, the following plan was adopted: To every malarial patient an intramuscular injection was given on the first day of the attack, and again on the following days: second, third, fifth, seventh, fourteenth, twenty-first, and tweny-eighth, i.e., eight injections during the month. While the patients were ill they were, of course, carefully warded off by mosquito nets, and, commencing generally on the third day, they were given a 5-gr. tablet of quinine every morning, and for as long as they remained in the malarious district. The results of this treatment were surprisingly satisfactory. The initial temperature did not fall much more rapidly, but when it did come down it kept down. There was not a single secondary rise or relapse during the first hundred cases carefully treated and observed, although previous to this treatment, by injections, three or even four rises of temperature during the first week of the disease was of quite common occurrence. On the fifth day the patient was generally fit for light duty, and for full duty after receiving the fifth injection on the seventh day. Arrangements for the patient's attendance, on the dates for their three remaining injections, were made through the man's company commander. Excepting the evening prophylactic quinine, no further quinine to assist the cure was given by the mouth. The injections were found to be quite sufficient. But they must be started in time before the disease gets a proper grip of the patient. Iron and arsenic were given to assist convalescence. In one hospital a solution of ferri et quin. cit. was administered by periodical intramuscular injections with apparently some advantage.

About two months after starting the quinine intramuscular injections five sepoys one morning complained of sore arms. They were fomented. Four resolved within three days, but one went on to abscess. He was treated in the lines by fomentations, and was back at full duty within three weeks. On investigation I found that this accident was caused by my Indian sepoy orderly inaccurately reporting that the quinine solution was boiled. The mistake was rectified, and the following morning my cases were injected as usual.

Not another injection caused any inconvenience, although about 3,500 injections were given in the field during the ensuing eighteen months. And when the enormous number of not only sore arms and hips, but also abscesses and even paralyses of the sciatic nerve caused by injection given on active service is remembered, it is hardly surprising that from time to time orders have been issued both in India and Africa prohibiting intramuscular injections of quinine. The improper use of a treatment does not, however, justify its abolition. And since intramuscular injections of quinine can be given repeatedly almost without being felt, and with no subsequent pain or tenderness whatever, it may not be considered superfluous to describe briefly of their technique a few points worthy of observation. A Burroughs Wellcome all-glass hypodermic syringe is the best. Cheaper syringes for this work are the very reverse of economy. Before boiling a little cold water should be drawn into the barrel of the syringe. Over the wire tray of a small sterilizer should be placed a small piece of white lint. A dissecting forceps should also be inserted so that at least its tips can be boiled. A Primus stove is most useful for now raising to boiling point the contents of the sterilizer. Boiling should be continued for five minutes. The cover of the sterilizer should be removed and turned upside down on the table. The syringe with needle is removed by the forceps and placed on the upturned sterilized cover. The operator's fingers should be thoroughly cleansed with methylated spirit, and one of the patient's deltoids painted over with spirit or tr. iodi. The ampoule is broken, reversed, and the solution drawn into the syringe. All air is expelled. The needle is then passed a few times through the boiled lint so as to remove any trace of quinine solution from the exterior surface of the needle. The operator then places his left hand in the patient's armpit, pushes the deltoid outwards, and at the same time, with his fingers and thumb, renders the skin over the outer aspect of the deltoid taut. The needle is then inserted by medium pressure perpendicularly into the muscle about 1 in. above its insertion. The solution is slowly injected. Two fingers of the left hand having been placed on either side of the needle without touching it, the needle is withdrawn without unnecessary haste. The pressure of these fingers prevents the skin being drawn outwards at the point of puncture, and also prevents the injected quinine solution escaping outwards into the space, which would otherwise be created on the withdrawal of the needle.

The quinine must then be dispersed. This is done by gently pinching the belly of the deltoid five or six times between the fingers, and asking the patient to do the same again in half an hour. This dispersion prevents any subsequent tenderness and the production of any nodules of fibrosis, which, if

allowed to occur to any extent, tend to hinder the proper absorption of subsequent injections.

The whole operation is often thus done and completed before the patient is even aware of its commencement; and the fact that all subsequent tenderness can be avoided by "dispersion" is more important than is generally realized, because sick people often cannot help dreading repetition of injections which they know from past experience will be painful. If the injections are given painlessly the patient's recovery is not retarded by insomnia.

It is well known, too, that hypodermic injections of emetine in the treatment of dysentery are often followed by tenderness if the little swellings due to the solution injected are not dispersed.

As described above, the needle prior to insertion is passed through the boiled lint so as to remove all traces of quinine which would otherwise remain along the track of the needle, and so predispose by its slight irritation to infection from the surface of the skin. How far this precaution is necessary is unknown, but certainly it does no harm.

The deltoids are in every way more convenient than the gluteal muscles. Ampoules of sterilized quinine solution from any reliable firm are accurate and convenient for use in the field.

(B) Personal Experiences.

In order to demonstrate as far as possible the *bona fide* nature of all these observations, the writer's own illnesses will be described as briefly as possible.

While in East Africa the writer was attacked three times by malaria: firstly, in January, 1916, in a camp near Lake Victoria Nyanza; secondly, in August, 1916, in Muanza, an unhealthy German town also near the Lake; and lastly, in July, 1917, just after being invalided from the Rufigi Swamps area. In the camp on the hill where I got my first attack there were practically no mosquitoes of any kind, so prophylactic quinine was not being taken. One evening I was bit by a mosquito. The mosquito I managed to catch, and found to my surprise that it was an anopheles. I therefore took 15 gr. of quinine, but not till about twenty minutes after being bitten. I also painted the spot on my wrist with iodine. Next morning I took another 10 gr. of quinine. Then I thought no more about the incident until fourteen days later, when, feeling unwell, I found my temperature was 102° F. As the previous day I had had a long trying march, and in addition had been soaked to the skin by a hailstorm, I thought this fever was possibly caused just by a chill, so I took no quinine. I reasoned that if I took quinine and got better, then I would not know whether my fever had been due to malaria or to the effects of the wetting. I fear I was somewhat experimenting. Next morning I had nearly forgotten my "indisposition" of the previous day and did my morning work almost as usual, but about noon I found my temperature was again a little over 102° F., so I made a blood film, and posted it to the Government laboratory at Nairobi. I then went to bed, and at 2 p.m. found my temperature was 106° F. I then had no doubt of what was wrong with me. A tepid bath brought down my temperature to 105° F. I injected into my left deltoid 7½ gr. of quinine at 3 p.m. At 4 p.m. I was again 106° F., if not a little over that. At 7 p.m. I gave myself another similar injection into my right deltoid. All the next day, the third day of the illness, my temperature remained at about 102° F., in spite of giving myself two more injections of quinine. Next morning my temperature was normal. It never rose again. I took a fifth injection that day, and during the following three weeks I took eight more injections, thirteen injections in all. I took no quinine by the mouth, and as I got no relapse, I consider that the thirteen injections radically knocked out the disease. Ten days after sending the blood film I got a telegram to say the film contained malignant malaria parasites. My temperature came down slowly, I think because I had taken no quinine during the first twenty-six hours of the illness.

My second attack of malaria occurred on the nineteenth day after arrival in Muanza in August, 1916. During the months intervening from the first attack I had on several occasions been tired out, and although I was taking no quinine, I yet suffered no relapse; and as Muanza was full of anopheles, I regarded this illness as due to a fresh infection. My temperature was 104·5° F. on the first afternoon. It was normal next morning and did not rise again. I gave myself eight injections.

My third attack occurred in July, 1917, nearly a year later, after being invalided from the notorious Rufigi Swamp district, in which I had been for over three months. For some days before reaching this district I took quinine, and then took a 5-gr. tablet of quinine hydrochloride every evening, generally soon after 4 p.m., which hour happened to convenience me. If not taken then, it was always taken some time before sunset, which was about 6.15 p.m. I was one of the three individuals, out of about 4,000, who managed to avoid contracting malaria during that time. Independently of one another we had all taken a tablet of quinine every evening. I was invalided with severe enteritis caused by salts in our drinking water. Then on the hospital ship I got malaria. I realized that this attack was undoubtedly due to my enteritis having prevented the absorption of my tablets of quinine during the previous three weeks. Very considerately I was allowed to inject myself. I injected 6 gr., and another 6 gr. next day. Then in a hospital I had to take 10 gr. of quinine twice daily for nearly three weeks, after which, on another hospital ship, I was again allowed to inject myself. I took 20 gr., 10 gr. into each deltoid. Since that afternoon I took nothing but about five small doses of "placebo" quinine. Eight months have now passed, during which I have been in bed from severe chills and colds, and yet I have not had a single recurrence of, or simulation of, an attack of malaria. I conclude that I am again radically cured, and that the cure is due to injection of 32 gr.

of quinine hydrochloride. For, although I had to take some quinine by the mouth in hospital, I am inclined to think that this just managed to keep the disease in abeyance until I had an opportunity of thoroughly eradicating it by one large injection of 20 gr.

Out of a total of twenty-five injections I suffered inconvenience from only one. This was in Muanza, when a European orderly, after boiling the syringe, apparently allowed it and its needle to cool on a piece of sterile cyanide gauze. Though an abscess did not form, I know what a sore arm is, and appreciate the amount of suffering that can be avoided by careful attention to the few simple details of technique described above.

Radical Treatment.

The following method of eradicating malaria from an individual is suggested. Seven injections each of 7½ gr. of quinine bihydrochloride should be given as follows: The first as early as the disease is diagnosed. The second and third on the morning and evening of the second day. The fourth injection on the third day. The fifth on the fifth day, and the sixth and seventh injections together on the ninth day. First relapse often occurs in orally treated cases about tenth day. Whilst being treated in a malarious district the patient should receive, in addition, prophylactic quinine from the third evening onwards. Also, even if removed to a non-malarious district, as a precautionary measure between the injections, small doses of quinine may be given orally. This suggestion for treatment is made tentatively in the hope that others, with suitable opportunities and with the assistance of a microscope and stains, will make investigations along the same lines to ascertain what the ideal cure is; for, although there is no doubt that hundreds of sepoys were cured by eight injections, spread over a month, there seems to be some evidence that smaller amounts, given over even shorter periods, but in greater concentration, will suffice for a cure.

It is rather remarkable in malaria that the curative medium seems to be more efficacious when it follows the same path, viz., from skin directly into the blood-stream, as that along which the disease has previously been injected by a mosquito. Ten grains of quinine taken into a healthy empty stomach often causes tinnitus within fifteen minutes, whereas after an injection of 20 gr. of quinine the writer experienced no tinnitus or any other inconvenience whatever. Is the greater efficiency of injections, therefore, entirely due to the quinine being then more slowly absorbed and more constantly present in the blood-stream, and ready always to attack any freshly hatched parasites? Of course, quinine taken by the mouth is so unpleasant that it is often vomited, and then it cannot be absorbed at all. But in addition to this, Can the alimentary juices and mucous membranes have any deleterious effects upon the salts of quinine?

It would appear that, if taken in time, the cure of malignant malaria is as easy, if not easier, as that of benign tertian malaria. Nevertheless, the term "malignant" is well justified, because if subtertian malaria is neglected in the early stages and allowed to become chronic, the patient is liable to be killed by either cerebral malaria or blackwater.

Cerebral malaria was the chief cause of deaths from disease among the exogenous members of the forces operating in East Africa. It occurs only in subjects of chronic malaria, and chiefly in those who have to continue working in the sun as pioneers or motor transport drivers. It occurred commonly in Cape boys who failed to properly protect their heads from the sun. It is probably the chief cause of unconsciousness in European children in Equatorial Africa.

A man working in the sun suddenly collapses and becomes unconscious. He is brought to hospital and said to be suffering from sunstroke. Almost invariably on blood examination his blood is found to be swarming with parasites often in the crescent stage. Unconsciousness from simple sunstroke occurs rarely, if ever, in East Africa.

A dose of quinine will quickly drive malarial parasites from the peripheral circulation, and therefore blood films should be made before any quinine is given. Again, if one believes that quinine is the antidote to malaria, it is reasonable, when a patient is found to be saturated with malaria, to give large doses of quinine. In cerebral malaria the tendency is to err on the side of not getting enough quinine into the system. The deeper the coma the more urgent must the treatment be. The patient may appear only stupid and hysterical or unable to speak and entirely unconscious. The temperature is not necessarily hyperpyrexial. It is more usually only about 103° F., though it does rise sometimes to 108° F. or over just before death. Pain and stiffness in the neck is a very usual symptom, and, in the absence of a microscope, often causes difficulty in diagnosis from cerebrospinal meningitis, a common disease among natives in East Africa. The meningitis can generally, however, be distinguished by Kernig's sign.

The treatment of cerebral malaria consists of giving large doses of quinine intramuscularly and also by rectum, and repeating the doses every four hours until consciousness is established. The doses are then gradually diminished. 15 to 20 gr. of quinine bihydrochloride are intramuscularly injected and well dispersed. 30 gr. of quinine hydrochloride, in about 8 oz. of tepid water, may then be injected high into the rectum. The solution is allowed to run in slowly from the barrel of a suitable glass syringe fitted with a rubber catheter. To assist in the retention of the fluid, the catheter should be squeezed between the fingers before withdrawal and the patient's buttocks compressed.

In one case of cerebral malaria treated similarly to the above, a blood-stained fluid escaped in about half an hour from the rectum. A little later hæmoglobinuria came on. However, the cerebral symptoms rapidly improved, and the blackwater disappeared after a few days' treatment with

salines. The patient became very weak. His temperature remained at 97° F. for four days, but after careful treatment for a fortnight he ultimately recovered.

A rather remarkable case was that of a European pioneer known to suffer from chronic malaria, although he conscientiously took tablets of quinine. One day he collapsed while working in the sun. He was admitted unconscious with his neck as stiff as a board. His temperature was 102° F. At first examination he appeared to have a marked Kernig's sign, but it was noticed that he laid in bed with his legs fully extended. A cerebrospinal meningitis case cannot do this. He always lies with his legs more or less flexed at the knee. It was also found that on trying to extend his forearms the patient resisted the movement, although almost unconscious. He was suffering from cerebral irritation. He had incontinence of urine and fæces, and immediately vomited any nourishment given him. His blood-film was taken, but unfortunately it could not be examined. Quinine was given intramuscularly and by the rectum. He improved for a few days, so that he was able to answer some questions rationally, but with indistinct articulation. His heart suddenly began to fail, and, in spite of strychnine, he died in a few hours on the fourth day. It is a pity that apparatus and facilities for giving a dilute solution of quinine intravenously were not available. It is in such cases as these that intravenous quinine given early would probably save life.

Is it possible that cerebral malaria may be caused by the small infected red blood corpuscles managing to penetrate into the fine capillaries of brain and cord, when these capillaries become dilated by the heat of the sun, and their being retained there, when the capillaries contract on the patient being brought into the shade? It is remarkable that benign tertian malaria with its enlarged infected red blood corpuscles seldom, if ever, causes cerebral malaria. Another theory that I have heard advanced is that the infected corpuscles are retained in the central nervous system owing to toxic endarteritis.

It may be well to mention here that seven cases of facial paralysis, one case bilaterally, occurred among malarial Indians stationed about Lake Victoria. None of them had any pain, and they all recovered completely in from four to eight weeks.

Blackwater Fever.

Every case seen had been preceded by at least one attack of malaria, generally by several attacks.

There are at least two types of malarial blackwater. The first is the common type, and is a comparatively trivial disease if treated in time. It is usually caused by a chill in a subject of chronic malaria. The conjunctivæ are jaundiced often some hours before hæmoglobinuria is noticed. The whole skin becomes more or less jaundiced. The liver is enlarged and tender. The enlarged spleen of chronic malaria is generally present, too. The urine is generally porter coloured; but sometimes the colour is a little deeper than that of ordinary feverish urine. In these cases the presence of hæmoglobinuria may be recognized by tilting the urine glass; on returning the glass to the erect position the urine will be seen to have left a transient red stain on the glass. Continuous bilious vomiting is the most distressing symptom of the disease. Frequently the temperature hardly varies at all for two or three days from about 101·5° F.

The treatment consists chiefly in starting with calomel, 5 or 10 gr., and making the patient take plenty of water to drink. This washes out the stomach and the kidneys. In a mug of water 10 gr. of each of sodi. bicarb. and sodi. citrate is taken every two hours. This helps to neutralize any acidosis. While the temperature remains constant, 10 gr. of sodi. salicylate may be added. Then when the temperature begins to fluctuate and comes down to 99° F. and the urine is clear, a half ampoule, say 3 gr., of quinine bihydrochloride may be injected. Blackwater has never been seen to recur after small injections thus given, though a case has been heard of where blackwater recurred immediately after a full injection, there having been an interval of a fortnight in which the urine was clear. The vomiting is generally checked by bicarbonate solution; but sometimes champagne appears to be the only thing that will stop the vomiting and carry the patient safely over a dangerous period of collapse. Chloroform in doses of ten drops in a little water every ten minutes is said to have stopped vomiting when everything else failed. Two or three of the above doses sufficed. Two bottles should be kept in which the colour of successive urines passed can be compared, and the colour becoming lighter gives great confidence to the patient. Many Europeans living in Equatorial Africa repeatedly suffer from mild blackwater, which they treat by simply taking plenty of fluid, such as lemonade. The second type is where the amount of urine passed rapidly diminishes down to complete suppression. These cases are believed to be almost invariably fatal. Out of about 100 cases of blackwater the writer saw only one case of this type. The case did not reach hospital until the fourth day, when he already had complete suppression. He was deeply jaundiced, but had practically no vomiting or temperature. The suppression continued in spite of large injections of subcutaneous saline. Otherwise he spoke cheerfully, took his food, and suffered no pain. Six days after admission he died quite suddenly. The operation of decapsulation of the kidney is rendered especially dangerous in these cases owing to hæmorrhage being almost uncontrollable.

Conclusions.

(1) African malignant malaria has been completely eradicated quickly and easily by means of quinine intramuscular injections spread over a month. Sixty grains of quinine bihydrochloride were given by eight injections each of 7½ gr. Further investigations along lines similar to those indicated above are required to ascertain with greater precision the minimum amount necessary for a cure, and the

best time for giving the successive injections. Oral quinine seems to be of little use beyond that of a temporizing measure. For the complete eradication of malignant malaria at least some injections are necessary.

(2) About 80 per cent. of cases of cerebral malaria can be cured by quinine if it is energetically injected into the muscles and the rectum. The remaining cases are usually both unconscious on admission and of fatal termination. Could these cases be saved by intravenous quinine?

(3) Although the great majority of cases of blackwater are easily cured, cases with suppression of urine are generally fatal. Will salines given intravenously restart the flow of urine in these cases? Or can any method of counteracting the tendency to hæmorrhage in these cases be devised? Can any substance be discovered which, on injection into the blood-stream, will neutralize the hæmorrhagic elements? And when this difficulty is surmounted, would decapsulation of a kidney be successful in restarting a flow of urine and thereby saving life?

Iodine in Surgery of the Eyes (R. Guiral, *Revista de Medicina y Cirugia*, April 25, 1918).—The action of tincture of iodine applied to the eye is not caustic. 107 cataract operations without iridectomy and seventy-four cases with iridectomy were all cured in three days. In four cases of hernia of the vitreous body all were cured in four days. It is harmless for the eyeball; no signs of irritation are apparent when the eye is dressed the next day. Even the vitreous body does not seem to be injured by it, while it wards off post-operative pain and promotes rapid healing.

Epidemic Hæmorrhagic Purpura (F. Giugni, *Riforma Medica*, January 12).—Endemic-epidemic appearance of hæmorrhagic purpura suggested scurvy among the troops on the firing line in 1916. Mountain climate, emotional stress acting on glands with an internal secretion, and defective diet may have brought on the disease, or the spirochæte found in various hæmorrhagic states.

Psychoses of Malaria (A. Porot and R. A. Gutmann, *Paris Médical*, March 30).—Experience of a *centre neurologique* emphasizes the imperative necessity for vigorous and persevering treatment (quinine) in all cases of the mental confusional state, the initial psychopathy, in malaria. Under proper treatment this often subsides, and thus is warded off the prolonged and rebellious form of malarial psychopathies. In one of the typical cases reported, the young man developed the syndrome of dementia præcox within a year of contracting malaria in Macedonia. No other pathologic antecedents were known in the personal or family history except that he had had convulsions as a child. In another case the man of 37 developed acute mania, but under seven months of sanatorium treatment regained his mental poise, although still somewhat excitable.

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THE JOURNAL OF

Tropical Medicine and Hygiene

AUGUST 15, 1918.

DR. SAMBON ON THE FUTURE OF WEST AFRICA.

AN interesting paper which has appeared in West Africa by Dr. Sambon is a marvel of concentrated knowledge, a masterpiece of scientific information and scientific revelation. Although published for readers other than medical men, the article is well worthy of perusal by even the most expert of our

tropical observers; but to the bulk of the medical profession, who are practically ignorant of the recent researches and findings in tropical medicine, the information it contains will, as well as to the public, convey a stock of information which to them is for the most part an unopened book, pregnant with exact knowledge; yet appearing more in the nature of a fairy tale, yet a tale of scientific truth, that has had no equal amongst the fantastic fables of the ancients or the mysteries of the Middle Ages.

Dr. Sambon's story of disease centres in Africa where it may be said parasitism obtained the mastery over men and animals, wrecking the prosperity of the continent, keeping the population of living creatures at a minimum, and rendering the lives of those who were spared, be they men or animals, a process of continuous warfare against disease. Had the continents of Europe and Asia been afflicted as Africa has been, it is not too much to say that the population of the world would have been reduced to one-tenth part of its present day figure, and in place of the assumed population of the world being placed at 1,500 millions, we could omit the last "0" in the number and put the population of the world at 150 millions only.

Dr. Sambon's article is, therefore, a timely one, for Africa is the question of the hour, and the health of the people, both white and coloured, the primary matter to be dealt with. The bankers, merchants, and others with African connections must combine in their fight. Individual efforts are important scientifically, but not sufficient when the general question of the fight against disease has to be dealt with. They ought to take a lesson from the Americans in the matter of applied science. When the present Panama Canal was proposed, the promoters of the scheme took the lesson afforded by the failure of the French in their great undertaking. The French failed not through want of skill or enterprise, but owing to the toll of lives taken by disease. They had practically exhausted the available labour supply in their endeavour, owing to the "unhealthiness of the climate." The Americans proceeded in accordance with the established scientific findings of the day, and sent a body of experts, headed by Colonel Gorgas, to the region where the proposed canal was to be made, and asked them to report upon the diseases of the district and how these could be combated. The result was a success beyond the imagination of even the most enthusiastic believers in the idea that disease, and disease alone, is the cause of failure in many tropical undertakings. Panama to-day, with its death roll of but 7 per 1,000, the lowest in any tropical, or for that matter in any temperate climate, shows what applied science can do. It is high time Africa was tackled in a similar manner. Send out your team of men to investigate what diseases are to be met with there, and state how they are to be fought. Let it not be said we sent out our young men to face the climate and see what happened to them. We know full well what will happen unfortunately, and it is imperative that this be recognized, and not slurred over by saying it is much better than it was. Is it? Our young men can only stand the climate for a year, or eighteen months at most, when a change home is necessary. Why? Why is this the only region of the globe where such a state of things exists? Is it disease? If not disease, what then? It is time this question was answered, and it can only be answered by investigation upon the spot. Is the climate so deadly? After all, what is climate? Is it the meteorological conditions that prevail that necessitate these frequent visits home, involving expense to the merchants, rendering our articles of commerce and the food obtainable from thence so expensive? Is it the poor food obtainable that causes deterioration of physique and renders resistance to climatic influences impossible, or is it disease? The latter is the present-day belief. If Panama, with a history as terrible as West Africa in its worst times ever afforded, can be transformed to a marvel of health, it is time to determine whether or not the African districts cannot be similarly converted. That they can be, no one with knowledge of tropical medicine doubts the possibility, and experts only long to have the opportunity of dealing with this question, which is of primary Imperial importance. Let those interested combine and take the question up; it will be the best investment ever they made were they to send Dr. Sambon and wisely chosen colleagues to the countries they are interested in to report and to draw up recommendations to be followed and applied. Dr. Sambon is mentioned first, as he is the pioneer in all matters involving the geographical distribution of disease, and an accurate enunciator of means of thwarting the encroachment of parasitic infection, and of the lines along which investigations should be conducted. Others may deal with the actual details of infection, but a broad grasp of the situation is needed, and in that direction Dr. Sambon is surely one of the foremost amongst known scientists. Were West Africa to make this subject its own a great good would result. Let it be a merchants' expedition, for with them it is a vital question. Government no doubt will afford facilities, but Government seldom acts unless the public demand, and it would be well were the business folk concerned to show that they are in earnest by providing a fund for the purpose.

The manhood of the nation is being sacrificed in war at a rate that renders recruiting for posts in the Tropics difficult. These difficulties will increase, and the question of supplying our Crown Colonies and Protectorates and business houses will become more acute, especially if the present rate of "casualties" from disease is not diminished. There is only one way to do it, and that way has been tested and tried by the Americans. They stamped out yellow fever in the West Indies by applied science; they completed the Panama Canal through the same agency. That the great merchants in this country can do the same goes without saying. It is not a question of this or that disease and the parasite that causes it that has to be dealt with,

it is the whole question. These individual questions have been most excellently well done by men sent from the Tropical Schools of London and Liverpool, but were men such as Professor Simpson, Dr. Sambon, Dr. Andrew Balfour, and others sent on a mission with ample funds and power given them, as Colonel Gorgas demanded and obtained before he started, then could we have the diseases they expunged in America eradicated also in Africa to the benefit of mankind, whether considered from the economic or the humanitarian points of view.

J. C.

Annotations.

Dermatitis in Sorghum Cutters and Harvesters.—G. Hoffer (*Policlinico*, April 14) found a peculiar dermatitis in twenty-five members of seven different families engaged in cutting sorghum. It gradually subsided in the course of three or four weeks. A parasite resembling a parasite found in flour was found in the sorghum, and was probably responsible for the dermatitis.

Vaccine Therapy in Malta Fever (P. Chiriaco, *Pediastria*, May).—Three typical cases in children show the remarkable curative value of vaccine—made by the Di Cristina-Caronia technique—in treatment of undulant fever. No time should be wasted on quinine dieting and intestinal disinfectants, but the vaccine should be given at once, as the patient grows worse under the other measures until irreparable damage results. The results of vaccine by intramuscular injection were always certain and extremely effectual, often actually remarkable from the rapid and complete disappearance of the infection.

A Newly Recorded Horse-leech Pest (Sambon, *West Africa*, August 3, 1918).—Of the many pests which afflict West Africa there is one not hitherto recorded, a large horse-leech (*Limnatis africana*) about five inches long when fully extended. It is seen in the bush on man, dog and monkey, attached to the mucous membrane of the nasal cavities, with the anterior part of its body often extended and dangling from the nostril like a rat's tail. It is taken into the system whilst drinking, and is said to occasion great debility and sometimes serious illness. A much smaller species (*L. nilotica*) is a well-known and dangerous parasite of horses, cattle and man throughout the Mediterranean region.

A West African Sparganum (Sambon, *West Africa*, August 3, 1918).—With regard to parasitic worms, I may safely predict that a sparganum will be added to the West African list of parasites affecting man, because twice already I have found in the rhinoceros viper (*Bitis nasicornis*) of West Africa, a kind of sparganum identical to the one (*Sparganum baxteri*) I described in 1907, from a specimen taken out of an abscess in the thigh of a Masai in British Central Africa.

Abstracts.

SECONDARY TUBERCULOUS PERITONITIS.[1]

By W. J. Mayo.

Tuberculous peritonitis is not a primary disease, but, like septic peritonitis, is symptomatic, having its origin in some local focus of infection. The most common sites of such local foci are the Fallopian tubes in women, some part of the intestinal tract in both women and men, and the lymphatic glands and channels, especially in children. Occasionally the primary focus will be found in the stomach, the spleen, the liver, the gall-bladder, or the genito-urinary tract. To consider tuberculous peritonitis an entity, or to treat it as such, leads to confusion, whereas if it is looked on as a secondary process, due to some primary focus, we are led to search for the primary focus and to direct treatment leading towards cure.

Removal of the Local Focus.

When the local lesion can be found and removed in operating for so-called tuberculous peritonitis, a cure may be expected in a much higher percentage of cases than by the performance of a simple laparotomy, with or without medication, the latter being unsatisfactory at best. In tuberculosis the fimbriated extremities of the Fallopian tubes are usually open, quite the opposite from the condition that exists in gonorrhœal infection of the Fallopian tubes, in which they are closed. In gonorrhœal infections, therefore, pus tubes are common, while in tuberculosis tubal retention is much less common, and the material from the tuberculous process passes out from the fimbriated extremity of the tube into the abdominal cavity, causing a more or less generalized peritonitis. Such peritonitis is essentially a conservative process leading to the destruction of the noxious agents. When the source of the infection can be removed the peritoneum returns to normal. At a subsequent laparotomy the peritoneum will be shown to be quite free from disease and without signs of past involvement, beyond adhesions in some locality that had been subjected to prolonged infection, as in the vicinity of the primary lesion. It is true that simple laparotomy sometimes cures the peritonitis when tapping would be of no avail, because when the fluid is completely removed from the peritoneal cavity, for example by operation, the fimbriated ends of the tubes, which had been mechanically separated by the fluid from the surrounding tissues, may become adherent to neighbouring structures, thus closing the ends and preventing further leakage. Under such circumstances tubal retention of the tuberculous products results, and these pus tubes may be recognized as gradually increasing masses in the pelvis. Further experience developed the fact that the tube thus closed became surrounded by a mass of adhesions,

[1] Abstracted from a paper from the Mayo Clinic read before the Section on Obstetrics, Gynæcology and Abdominal Surgery, at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918.

and occasionally, in the course of long months or years, a spontaneous "near" cure resulted. The tubal content became caseated, and was rendered more or less innocuous with the gradual disappearance of the pelvic masses, but with permanent fixation of the pelvic organs. The ciliated epithelium of the tubes, like the ciliated epithelium of the pulmonary tract, is very susceptible to tuberculosis. Whether the tubercle bacilli reach the tubes primarily through some other focus in the abdominal cavity and then gravitate into the pelvis infecting the tubes, or whether they pass directly by way of the vagina and uterus or through the lymphatics, is a mooted question.

Tuberculosis of the endometrium is rarely found in the menstruating uterus. When tuberculosis involves the endometrium, it is usually found in children before menstruation begins or in women after the menopause. If it occurs during normal menstrual life, menstruation will have ceased, although in its place there may be a bloody discharge, the result of the tuberculous lesions.

In tuberculous peritonitis which is the result of tubal tuberculosis, the removal of the Fallopian tubes may be expected to cure, unless other incurable tuberculous lesions coexist. It is not at all necessary in such cases to remove the ovaries or the uterus, as their involvement is only superficial, and in no way different from that shown in the peritoneal coverings of the intestines and the other viscera.

Knowledge of tuberculous peritonitis, the result of tubal disease, is fairly adequate; but, when the local lesion is elsewhere, great difficulty may be experienced in locating and removing the primary source of the peritoneal infection. Rarely is the appendix alone the cause of tuberculous peritonitis. Tuberculosis of the ileo-cæcal coil, including the appendix, especially of the hyperplastic type, is often accompanied by tuberculous peritonitis, which, as a rule, is limited to the immediate vicinity of the primary disease, and the removal of the involved bowel promptly cures. This is equally true of localized tuberculosis of the small intestine.

Many cases of peritoneal tuberculosis are confined to the region above the transverse colon, in which the lesion was particularly marked in the vicinity of the gall-bladder and the pyloric end of the stomach. In most of these cases the gall-bladder, which had shown colecystitis, was removed; but we have not been able to determine that there were tubercle bacilli in the gall-bladder or its contained secretion, nor have we found local lesions that might have been the result of focus in the liver. However, such patients, without exception, have quickly and permanently recovered. It is questionable whether such recovery might have taken place without the removal of the gall-bladder.

Barker (in America) estimates that 50 per cent. of cases of tuberculous peritonitis are due to bovine tuberculosis. The English Commission on Tuberculosis (1911) showed that tuberculous peritonitis was due to bovine tuberculosis in nearly 47 per cent. of the cases, and the German Commission showed it to be due to this cause in 63 per cent. It is possible that bovine tuberculosis gives a more favourable prognosis than human tuberculosis.

Simple Laparotomy.

The possibilities of the cure of tuberculosis of the peritoneum by simple laparotomy, when the local focus cannot be discovered and removed, are limited to the ascitic forms of the disease. It may at least be said that an open operation with careful removal of all fluid, with or without medication, has therapeutic value. It would seem, however, that the surgical profession has been over enthusiastic in its praise of the simple operation. The fibroplastic types are benefited only if there are sacculations containing fluid; but operation is contra-indicated when the adhesions fill the entire abdomen without collections of fluid, or if the collections consist of multiple small pockets filled with turbid tuberculous exudate containing pus. Operation in these cases with separation of adhesion is of little value, and often results in intestinal fistula. Fortunately the adhesion type of tuberculosis of the peritoneum giving rise to the swollen, hard (wooden) abdomen are most favourable for spontaneous cure.

It seems probable that tubercle bacilli alone tend to produce tuberculous peritonitis with a minimum of adhesions, and that to a considerable extent the adhesions are the result of a mixed infection; but as the pyogenic bacteria that are admitted with the tubercle bacilli are shorter lived, they disappear, leaving only the tubercle bacilli to be discovered at operation. In several subacute cases of this description not only is a mixed infection found, but also localized pockets of pus, containing colon and other bacteria having their origin in the intestinal tract. Later, these pyogenic bacteria would have disappeared and only the tuberculous process would have been discoverable.

Curiously enough, while all the surgical cases, and for that matter all the medical cases observed, show an excess of females over males, the post mortem findings show peritoneal tuberculosis to be more common in the male.

The English school has strongly advocated drainage following laparotomy for tuberculous peritonitis; but drainage has been almost abandoned in America on account of the frequency with which mixed infection has followed, often with fistulas which became feculent. After laparotomy, as a rule, there is a reaccumulation of the fluid, which is said to have a higher opsonic index, and therefore a higher resistance against tuberculosis than the fluid that was originally removed. The fluid reaccumulated directly from the blood has marked sterilizing properties.

It should not be forgotten that tuberculous pleurisy or tuberculous pericarditis may exist in conjunction with tuberculous peritonitis. When there is doubt as to whether or not an ascites is due to tuberculous peritonitis, the finding of fluid in one or both of the pleural cavities is strong but not positive evidence, as the same condition is found in

Concato's disease. Chronic irritative peritonitis or chronic proliferative polyserositis, as described by Concato, may be local or general. The spleen or the liver, or more often both, may be encapsulated, or the entire abdominal cavity may be involved with most extraordinary shortening of the mesentery of the intestine. The contracted intestinal tract may be covered with an adhesive membrane and be drawn close to the spine. Chronic ascites is usually marked. The peritoneum, in the later stages, may be a quarter of an inch or more in thickness and of a white colour. In the more extensive cases both pleural cavities are involved, and often the pericardial sac as well.

Pick's disease is undoubtedly only a syndrome, a subdivision of chronic proliferative serositis, in which the chief manifestation is cardiac crippling, due to pericardial adhesions, although Pick believes that the pleural and peritoneal involvements are results of changes brought about in the circulation by interference with cardiac action. In none of the cases of chronic proliferative peritonitis that I have seen was the diagnosis made until the abdomen was opened, and the condition was confused with tuberculous peritonitis. However, some observers believe that tubercle bacilli are the causative factor. It is altogether probable that chronic proliferative polyserositis is frequently, if not usually, confused with the ascitic forms of tuberculous peritonitis. Except for the temporary relief of the ascites, laparotomy is of no value in Concato's disease. It is said that the fluid aspirated may be distinguished by chemical analysis from tuberculous fluid; this has not been confirmed in our cases. As to the frequency of Concato's disease, Fagge[1] states that he saw one case of ascites from this cause to three of cirrhosis of the liver.

It will be seen from this brief summary that the cases of tuberculous peritonitis, in which surgical treatment promises to be of great aid, rather naturally divide themselves into two groups: First and most favourable are those cases in which a definite anatomic portion or viscus of the peritoneal cavity is involved, such as the Fallopian tubes, the ileocæcal coil, and the appendix, which can be removed. Second, and less favourable, are those in which the peritoneal cavity contains a considerable quantity of fluid, occupying either the entire peritoneal cavity or a large part of it, or in which the fluid is contained in loculi composed of peritoneal adhesions, dividing the peritoneal cavity into compartments containing fluid.

Operating on the dry adhesive type of peritonitis is of no advantage to the patient; but a bad prognosis should not be given in such a case. Ultimately these patients are likely to develop tuberculosis in some other region. Appendiceal tuberculosis exists, but it is more rare than other diseases that would cause it as a focus. It is more rare in the woman. Man makes up for the difference in that his genital tract gives him tuberculosis which does not extend into the peritoneum. The woman develops general peritonitis. Nature can deal with that if you take the fluids out. Take plenty of time and see that the fluids are out when the intestines are dropped down. Nature will then deal with the condition as in caseous glands. I am sorry that more of the large sanatoriums have not representatives here. The mistake is sometimes made of regarding tuberculosis of the ileocæcal coil as a primary tuberculous lesion of the appendix. In opening the abdomen, if operation can be delayed until the primary fever is over, the cases do better than with operation at an earlier period. Patients will develop their own antibodies if given the opportunity. When the peritoneum is covered with miliary deposits it is easy to differentiate between the discrete and the confluent. When the confluent form is present, there is your focus. When widely separated the lesion is in the upper abdomen, but you cannot always find just where it is located.

[1] Fagge, C. H.: "Text-book of Medicine," Ed. 4, 1902, ii, p. 488.

Discussion.

R. T. Morris: Follow-up treatment in cases of surgical tuberculosis is important. Surgical tuberculosis of any sort needs sending the patient to a 5,000 ft. elevation in the mountains, then to the seashore, and the best of food. Tuberculin, the old formula, is very essential, used in connection with the follow-up treatment. Of two cases of adhesive peritonitis in which the patients are now perfectly well, one was a patient supposed to be a case of abdominal tumour. At operation the patient was supposed to have malignant papillomata, and considered to have about six weeks to live. A year later the patient had gained 40 lb. and was apparently perfectly well. She had had tuberculous peritonitis of this adhesive type. The second case was one which I operated on. A specimen removed proved to be tuberculous, and this was confirmed by the subsequent history. The primary focus was not removed in this case. Under tuberculin and the influence of general first-rate follow-up treatment, that patient has become perfectly strong and well.

D. N. Eisendrath: First, what shall we do with tuberculous tubes? Four years ago a patient, a young girl, aged 17, unmarried, had tuberculous tubes and a large secondary mass of tuberculous glands in the region of the sigmoid. We laparotomized her, intending to remove the tubes, but after section decided to leave them. She married later, and went through two successful pregnancies at full term. This made me rather wonder whether we had not better be a little conservative in removing tubes under those conditions. The second point is Dr. Mayo's experience of having very few cases of tuberculous peritonitis following tuberculous appendicitis. The opposite has been my own experience; this is due to the fact that frequently the appendicitis attack and the tuberculous peritonitis symptoms are months apart; frequently the appendix is taken out at an earlier period, probably six months or a year before the patient is treated for tuberculous peritonitis, when, unfortunately, the appendix was not examined carefully. I recall several cases in which only microscopic examination showed sub-

mucous tuberculosis in the appendix. I have seen a number of cases in which the patients presented typical histories of tuberculous peritonitis and laparotomized them even when they had been appendectomized several years before. Evidently the focus had been at that time in the appendix.

H. G. Wetherill: Experience in Colorado confirms the opinion that general tuberculosis not infrequently does follow what appears to be a primary focus in the appendix. It is distinctly and definitely unwise to drain cases which have been operated on for tuberculous infection in the peritoneal cavity, whatever the primary focus may have been. We have learned only within the last few years, apparently, how much resistance to infection the peritoneum has and how well it may take care of itself. If we drain these cases we are in definite danger of producing tuberculous adhesions, and furthermore, we run the very great risk of producing tuberculous fistulas in the intestine, because the intestine will ulcerate through to the drainage tube. Otherwise it would be protected by plastic exudate. In Colorado we take no risk whatever with the drainage tube.

CHRONIC SEPTICÆMIC ENDOCARDITIS, WITH SPLENOMEGALY TREATMENT BY SPLENECTOMY.[1]

By D. Riesman.

Patients suffering from this type of endocarditis may become bacteria free and yet succumb to the disease. If death were an early event, the failure of our efforts might be more readily understood; but the affection may last for months or even for one or two years, so that ample time exists for treating it, and yet nearly every case terminates fatally.

The outstanding features are fever of long duration, which may resemble that of tuberculosis or malaria; anæmia of varying intensity, sometimes so severe as to suggest one of the primary anæmias; pains in the joints; petechial spots on the skin and mucous membranes; and a heart murmur. Albuminuria is common, and in later stages the signs of a true nephritis may appear. Abdominal pains, sometimes sudden in onset and suggesting embolic processes in the spleen or kidneys, are not infrequent. Cough and insomnia are often very troublesome. From the diagnostic point of view, the heart murmur is the most important thing: it may be very faint or it may be loud and distinct. Cases have mitral, aortic, and pulmonic lesions; on the whole, however, the aortic cases are the most frequent. The affection nearly always attacks a valve previously diseased as the result either of rheumatism or of some allied condition, such as tonsillitis or chorea. It may, however, have its starting point on an intact valve, as in gonorrhœa and in pneumonia, in which the pulmonic valve becomes involved. Such cases generally run a more acute course, with higher fever, and do not present so prominently the renal features. There is a primary chronic form of endocarditis, however, which in its course and termination is indistinguishable from that in which the lesion is a secondary one on a previously diseased valve.

One other feature is important, and that is the condition of the spleen. This organ is practically always enlarged, and in some cases so much enlarged that it becomes the dominant feature to the point of completely obscuring the underlying heart affection. It is of this group of cases, those characterized by a true splenomegaly, that I wish especially to speak. The spleen may extend down to the level of the umbilicus or even lower; it is smooth, rather firm and rarely tender, though often the seat of spontaneous pain. Such a striking enlargement may readily lead to a wrong diagnosis, especially to that of splenic anæmia or of Banti's disease. It is easy to see why such a diagnosis might be made. There is the prominent spleen, the profound anæmia, at times a striking leucopenia; and if a murmur is found, it will often be attributed to the anæmia. Petechial hæmorrhages, so valuable in the diagnosis, may be entirely absent throughout the long course of the disease.

I am inclined to think that in more than one case of so-called splenic anæmia or Banti's disease treated by splenectomy, the condition was in reality chronic septicæmic endocarditis. The leucopenia in a disease in which one would expect leucocytosis might readily, though erroneously, tilt the diagnostic scale in favour of splenic anæmia.

Watching a number of cases in the last two or three years, and finding that neither autogenous nor stock vaccines, transfusions, drugs, or other measures did aught to avert death, I began to wonder whether there was not some other factor besides the heart that was of importance in the fatality of the disease. While embolic processes in the kidney undoubtedly play an important rôle in the course of the disease, it is wise to direct attention to the possible significance of the large spleen. The spleen is a filter for bacteria. Whether it kills them or only benumbs them, leaving their final execution to the liver, is not definitely known. Bacterial filtration is not a passive process, but it is dependent on vital activity of the cells, on a selective action on their part, a bacteriotropism. The filtration causes an accumulation of bacteria in the spleen which leads to hypertrophy, a sort of work hypertrophy. Through the multiplication of bacteria, and perhaps through their subsequent autolysis, increased quantities of toxins are thrown into the circulation. Moreover, living bacteria are often present in old infarcts of the spleen. In these ways an infectious disease may be kept up and perpetuated, although the primary focus is no longer existent or active. An example or two will serve to illustrate this point. In syphilis the spleen at times is greatly enlarged, and in such cases antisyphilitic treatment does little or no good, probably because the spirochætes are well protected in the spleen pulp and tissues. Removal of the spleen brings about a cure, especially if it is followed by a course of anti-syphilitic treatment. In chronic

[1] Abstracted from the *Journ. Amer. Med. Assoc.*, July 7, 1918.

malaria the blood is often free from plasmodia, while the spleen shelters them in enormous numbers.

May not, therefore, the long continued existence of bacteria in the spleen in endocarditis be the principal reason why the so-called bacteria-free cases go on to a fatal termination? If we could get rid of the large disease-harbouring focus represented by the spleen, it might be possible to deal with the bacteria present in the heart valves. Enough antibodies might be developed to destroy them; while as long as the spleen continues to pour toxins into the blood, the body, as we know only too well, can never make any headway.

There is another factor to be considered. Enlargement of the spleen is brought about chiefly by a proliferation of cells, to a lesser degree by an increased blood content. This proliferation causes the pouring into the circulation of enormous quantities of metabolic products that have to be handled by the liver and other organs and tissues.

In view, therefore, of the hopelessness of our treatment of chronic septicæmic endocarditis, and in view also of the value of splenectomy in other infectious diseases—as in syphilis, malaria, and in splenic anæmia, if that be infectious—I believe we are warranted in removing the spleen in cases of septicæmic endocarditis in which the organ is enlarged. In this connection it should be remembered that, as William Mayo has pointed out, enlargement of the spleen may exist even though the organ cannot be palpated.

On the basis of these thoughts we undertook the operation in one case, and while the ultimate outcome was not all we had hoped, failure was due to an unusual complication which caused the patient's death some time after the operation.

Report of Case.

1. F., a man, aged 57, had been failing in health for a year. In the past four months he had a more or less continued fever, associated with joint pains, but without joint swellings. His spleen had been enlarging, at first gradually, of late more rapidly. A profound anæmia had coincidentally developed. From time to time there had been attacks of sharp pain in the left hypochondrium. At no time had he had any hæmorrhage from the nose, mouth, or bowel. Twelve years before, following an injury to the head, he began to have epileptiform seizures of Jacksonian character, which later gave place to attacks of petit mal. On October 31, 1917, I found him exceedingly pale and weak. The heart was somewhat enlarged, and there was a systolic murmur at the mitral area transmitted into the axilla. This murmur had existed for many years. Petechial spots were present over the legs. The most striking feature, however, was an enlarged spleen which extended to the level of the umbilicus. A blood examination revealed: hæmoglobin, 45 per cent.; red cells, 2,220,000; white cells, 4,800, with 82 per cent. polymorphonuclear cells. Considering the case to be one of septicæmic endocarditis with splenomegaly, I advised removal of the spleen, preceded by transfusion. Two transfusions were done; the second, which was of appreciable benefit, February 3, 1918. February 5 the patient's blood count revealed: hæmoglobin, 40 per cent.; red blood cells, 2,020,000; white blood cells, 4,450; polymorphonuclears, 80; lymphocytes, 6; large mononuclears, 8; transitionals, 6; eosinophiles, 0.

The urine was yellow; of acid reaction; specific gravity, 1,015, and showed albumin, a faint trace; sugar, none; urea, 1 per cent.; bile, 0; indican, 0; diacetic acid, 0; acetone, 0; many granular casts; epithelial cells; white blood cells.

The phenolsulphonephthalein test resulted as follows: the first hour, 7 per cent.; second hour, 12 per cent.; third hour, 14 per cent.; total, 33 per cent.

The blood urea was 66 mg. per 100 c.c. of blood.

February 6 the spleen was removed by Dr. Deaver under ether anæsthesia. It was found to be enormously enlarged and adherent to the diaphragm at the upper pole.

The spleen with blood weighed 1,570 grm.; without blood, 1,160 grm. The surface showed two scars, evidently the result of infarction. Microscopic examination was: "The spleen is not the spleen of Gaucher's disease, Banti's disease, malaria, tuberculosis, syphilis, Hodgkin's disease, or the leukæmias. There is endothelial hyperplasia, diffuse around the blood sinuses, just as in the ordinary acute splenic tumour, e.g., typhoid. The inference is that the patient had a long-standing infection of very low virulence or a long-standing toxæmia."

The day following the operation the hæmoglobin rose to 50 per cent. and the red cells to nearly 4,000,000 from 2,020,000. At the end of a month the hæmoglobin was 55 per cent. and the red cells just under 3,000,000, and the leucocytes had risen to 6,250, with 68 per cent. polymorphonuclears instead of 80 per cent.

On the ninth day the stitches were removed, but there was no healing, and the patient eviscerated himself. The bowels were reduced, and the wound closed under chloroform anæsthesia. No infection ensued.

After the operation the patient improved amazingly in appearance; his hands were no longer cold, and he lost the yellowish cachectic pallor which had been such a striking feature. The operation justified itself by the improvement that followed.

March 9 the patient began to have trouble with his larynx and extreme difficulty in breathing. On examination there was thought to be an abscess of the larynx. Before anything could be done the man died.

Comment.

The man thus lived a month after the operation; and notwithstanding the fact that he had eviscerated himself and had to have a second operation, his general condition as well as the blood showed a decided improvement. While we do not know what would have happened had the laryngeal abscess not supervened, it is reasonable to suppose that the improvement would have continued.

Original Communications.

PARAMYCETOMA.

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CONTENTS. — *Preliminary — Definitions — Paramycetoma — Clinical Remarks — Diagnosis — Prognosis — Treatment — Paramycetoma and Neomycetoma—References—Illustrations.*

Preliminary.—The present short note is the fourth of a series of papers which, starting with mycetoma, will end in an attempt to invite the attention of the tropical practitioner to the relationship between certain fungal infections and varied types of new growth of a malignant nature.

The series commenced in 1916 by the publication of a paper by us entitled "A Sudanese Madura-mycosis," and was followed by a paper by one of us and Dr. Christopherson upon "A Sudanese Actinomycosis." These two papers were utilized as an endeavour to clear up the subject of *Mycetoma*, and were followed in 1917 by a paper by us called "Mycetoma and Pseudomycetomatous Formations," in which we defined and briefly considered the subject of the *Paramycetomas*, and more recently in this journal by another paper entitled "A Classification of the Mycetomas."

The present note is intended to emphasize the *Paramycetomas*.

Definitions.—In order to make clear the remarks given below, it is necessary that the reader should be acquainted with our definitions of Mycetoma, &c.

> "The term *Mycetoma* includes all growths and granulations which produce enlargement, deformity, or destruction in any portion of the tissues of man, or animals, and which are caused by the invasion of the affected area by fungi belonging to different genera and species which produce bodies of varying dimensions, colour, and shape composed of hyphæ, and sometimes chlamydospores, embedded in a matrix. These bodies, which are capable of giving rise to mycelial filaments on germination, are termed *grains*, and are found either embedded in the pathological tissue forming these growths and granulations or escaping freely in the discharge therefrom."
>
> "A *Pseudomycetoma* is a growth which, though clinically resembling a typical mycetoma by the presence of swelling, ulceration, and discharge, differs therefrom in the absence of grains in the tissues and the discharge, and, moreover, is different from the *Paramycetoma* in that no eosinophile bodies can be found in the tissues."

These two definitions clear the way for the consideration of the Paramycetoma, to which we now turn.

Paramycetoma.—During the past five years we have found considerable difficulty in making pathological diagnoses with regard to specimens which have been sent to these laboratories from cases varying clinically from those which have been considered to be chronic ulcers and innocent tumours to those definitely diagnosed as cancers, epitheliomata, or sarcomata.

The experience of these years has compelled us to decide that this form of tumour is worthy of serious consideration, and for purposes of recognition should receive a special name or names, supported by a definition.

Personally, we think that there are two pathological classes, closely allied, demonstrable in the material which we have examined, but for the time being we concern ourselves with only one of these two classes, viz., the *Paramycetoma*, which we define as follows:—

> "A *Paramycetoma* is a term which includes all growths and granulations producing enlargement, deformity, and destruction in any part of the tissues of man, or animals, which are caused by the presence of fungi of any nature whatsoever, but in which grains are either entirely absent or are so few in number and small in size as to escape observation without prolonged search."

To this class of mycetomatous growths belong, we believe, the specimens from different parts of the body which have been sent to these laboratories from cases which have been clinically and provisionally diagnosed as malignant disease of various kinds, e.g., sarcomata, epitheliomata, and rodent ulcer. We have met with these growths from the face, the limbs, the body, the mouth, the intestines, and the vagina.

So far we have been unable to obtain cultures of the fungal elements which we found in these tumours, and animal inoculations in our hands have failed to produce infections, but it is quite otherwise in the recent work done by the Leytons, with which we have only just become acquainted. They have obtained Nocardial cultures eleven times in rat sarcoma and mouse carcinoma, and sixteen times out of twenty-one human tumours examined, but we consider that the work done by these two investigators bears more distinct reference to our second class—Neomycetoma—than to our first class, Paramycetoma—and therefore we do not at present propose to consider this valuable research beyond pointing out that two sets of observers, working in different parts of the world and without knowledge of each other's researches, which were conducted on entirely different lines, have reached apparently a similar goal.

They have approached the point through malignant growths, as seen in England; we have studied it through mycetomas and malignant growths as seen in the Sudan; and not until we thoroughly understood the mycetomas could we define the position of the Paramycetoma or understand the Neomycetoma.

Clinical Remarks.—The Paramycetomas, as already stated, cannot be recognized without microscopical assistance, because they present a varied group of clinical forms comprising chronic ulcers which may seem to be non-malignant, doubtfully malignant or malignant (fig. 1), of growths which appear to be innocent or which are capable of diagnosis as doubtful carcinomata, epitheliomata (fig. 1), or sarcomata, or with reference to which no doubt is entertained in the mind of the surgeon attending them.

If removed in the more innocent forms or in the early stages they probably do not recur, but in the later stages of the malignant forms they do recur, but probably then as true malignant growths.

As a diagnosis cannot be made clinically, it behoves us to inquire upon what it is to be based.

Diagnosis.—The recognition of a *Paramycetoma* is based entirely upon microscopical examination, and consists in finding one or more of the following features:—

(*a*) Peculiar eosinophile bodies.
(*b*) Fungal filaments.
(*c*) Minute grains.
(*d*) Cultures and animal experiments.
(*e*) Minor points.

(*a*) *Peculiar Eosinophile Bodies.*—These bodies are depicted in figs. 2, 3, and 4, which show single bodies enclosed in cells, several large and apparently free bodies.

In our opinion these bodies are composed of a chemical substance, apparently formed in human tissues by several different kinds of fungi, but more particularly by the Nocardias. The substance may be noted lying in a lymphatic, or in the form of these bodies in cells at a considerable distance from the site of the fungus. Hence their importance in diagnosis and the necessity on discovering them for further search in the tissues, or the patient, for a fungus.

(*b*) *Fungus Filaments.*—The most common filament to be found in a Paramycetoma is the *Nocardial Hypha*. These are easy of recognition to the trained eye, but are apt to be mistaken by persons not acquainted with mycology and to be recognized as bacilli, while their spores, if present, may be considered to be micrococci. They are shown in fig. 5.

Other forms of fungi, however, may cause a Paramycetoma; thus fig. 7 shows a broad septate hypha, which we think probably belongs to a fungus of the type of a leptothrix.

It will thus be seen that just as we divided the Mycetomas into the Actinomycoses and the Maduromycoses, so can the Paramycetomas be divided by the nature of the hyphal filaments into the *Paractinomycoses* and *Paramaduromycoses*.

(*c*) *Minute Grains.*—These grains may be illustrated by that depicted in fig. 6. They are very minute in size, and very few in number, and, in our experience, are most difficult to find, and, indeed, are perhaps often absent when the case may be due entirely to hyphal filaments not collected into grains.

(*d*) *Cultures and Animal Experiments.*—We have been unfortunate with our attempts at cultivation and in our animal inoculations, but the success attained by the Leytons indicates that these can be done at all events with certain species of fungi. Our climatic difficulties must be remembered in connection with our failures.

(*e*) *Minor Points.*—Among minor points which are worth noting are the presence of many plasma cells either in good condition (fig. 8) or degenerated (fig. 9).

The condition of the vessels, which often show endarteritis or periarteritis, just as in mycetoma (fig. 10), is also worthy of note.

Another minor point is a peculiar glassy or vitreous macroscopical appearance, which is due to a degeneration of the tissues of a glassy nature, and must not be mistaken for hyaline degeneration.

For certain diagnosis the fungal filament should be found, but, failing this, the eosinophile body is of the utmost importance. These bodies, if associated with many plasma cells, degenerated plasma cells, and changes in the blood-vessels and glassy degeneration, are almost pathognomonic of the presence somewhere of a parasitic fungus.

The differentiation from *Myectoma* is not difficult, as the grain is readily found in this growth, which it certainly is not in a *Paramycectoma*.

The differentiation from *malignant growth* is at the same time very easy and very difficult. Very easy because at once the specimen appears somewhat different from the typical malignant growth simulated, and very difficult because it may require prolonged search before definite evidence of the presence of a fungus is found.

Prognosis.—This depends upon the site and age of the tumour and its association with malignant characters or not. If the last feature is absent, and the growth is small and can be completely removed, the prognosis is good, otherwise it is bad. If glandular excision is performed, the presence or absence of infection is of the utmost prognostic value.

Treatment.—The only known satisfactory treatment is the early and complete removal of the growth associated with glandular excision.

Paramycectoma and Neomycetoma.—In order to connect this paper with the next which we hope to publish, we give an illustration of a Paramycetoma (fig. 11) which shows a squamous-celled epithelioma, but in this specimen giant cells, plasma cells, and eosinophile bodies were present, and it would equally resemble a portion of the specimen which showed the grain (fig. 6) composed of Nocardial filaments. These specimens were typical Paramycetomata, but if the epithelioma portions alone had been present the diagnosis would have been difficult, and we propose the term Neomycetoma for such malignant growths as do not show eosinophile bodies or mycelial filaments, but to this we hope to refer at some future date.

Khartoum, May 3, 1918.

PLATE I.

Fig. 1.

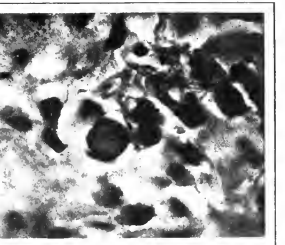

Fig. 2.

Fig. 3.

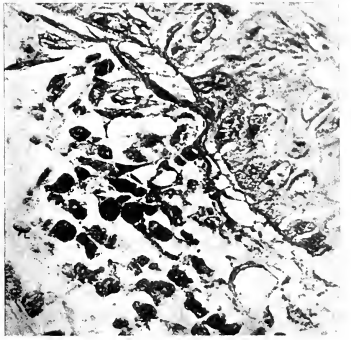

Fig. 4.

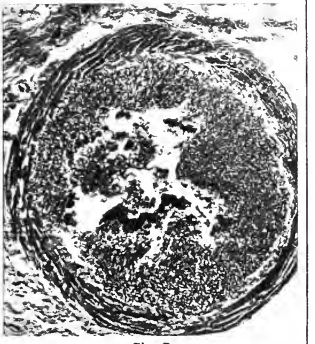

Fig. 5.

To illustrate paper, "Paramycetoma," by ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H., and Major R. G. ARCHIBALD, M.B., D.S.O., R.A.M.C.

PLATE II.

Fig. 6.

Fig. 7.

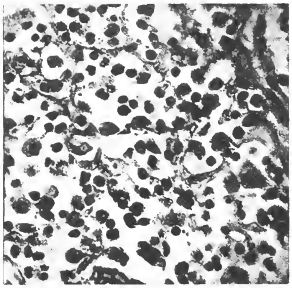

Fig. 8.

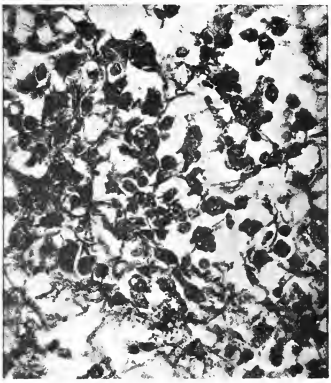

Fig. 9.

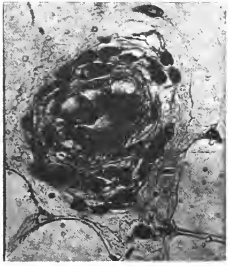

Fig. 10.

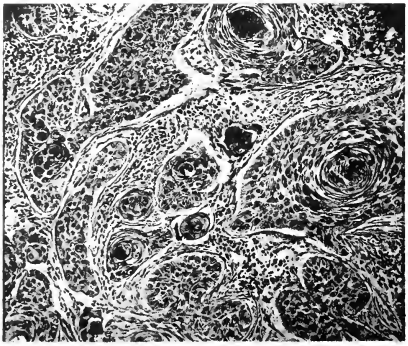

Fig. 11.

To illustrate paper, "Paramycetoma," by ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H., and Major R. G. ARCHIBALD, M.B., D.S.O., R.A.M.C.

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ILLUSTRATIONS.

PLATE I.

FIG. 1.—Case of *Paramycetoma*. Photograph.

FIG. 2.—Eosinophile body. × 550 diameters. Photomicrograph.

FIG. 3.—Eosinophile bodies. × 600 diameters. Photomicrograph.

FIG. 4.—Eosinophile bodies. × 700 diameters. Photomicrograph.

FIG. 5.—Nocardial filaments. × 750 diameters. Photomicrograph.

PLATE II.

FIG. 6.—A minute Nocardial grain from a Paramycetoma. × 1,300 diameters. Photomicrograph.

FIG. 7.—A Leptothrix-like filament from a Paramycetoma. × 1,400 diameters. Photomicrograph.

FIG. 8.—Plasma-cell infiltration from a Paramycetoma. × 500 diameters. Photomicrograph.

FIG. 9.—Cellular and glassy degeneration from a Paramycetoma. × 500 diameters. Photomicrograph.

FIG. 10.—Periarteritis and Endarteritis from a typical Mycetoma. × 400 diameters. Photomicrograph.

FIG. 11.—Paramycetoma showing epithelioma-like structure. × 100 diameters. Photomicrograph.

AN OBSCURE CASE OF MALARIA.

By C. S. CRISPIN.

Director, Medical Department, Sudan Government.

THE following case presents points of difficulty and interest worth recording:—

M. was seen on February 5, 1918, suffering from fever (temperature 101° F.), headache, vomiting, constipation, cold extremities, and cardiac distress. On examination no enlargement of the spleen or evidence of organic disease of the heart was found; the heart sounds were normal and the pulse weak. He was a known diabetic, and had 4·76 per cent. of sugar in the urine a month previously. He was passing extremely little urine of high colour; a specimen was sent to the laboratories for acidosis test. Blood films were also sent for examination for malaria.

The report received was as follows: *Urine* contains acetone, diacetic acid and B. oxybutyric acid, in addition to sugar, and is very acid. *Blood films*: No malarial parasites, no mononuclear increase, distinct polymorphonuclear increase.

Patient was immediately put on a fluid diet and given 30 gr. of bicarbonate of soda every two hours, and when seen again the same evening was better, the cardiac distress and vomiting having ceased. The bowels had been opened by enemata. On February 6, 1918, he was seen in the morning and found much better. No fever, headache, or vomiting. Urine contained sugar, no casts, no diacetic acid, and was alkaline; there was slight albuminuria, and phosphates were present; the quantity passed was small. The bicarbonate of soda was continued. On February 7, 1918, his condition was practically the same as on February 5, 1918. He had had a very bad night with slight fever, cardiac distress, and vomiting. He could not take his medicine, and small doses of 5 gr. of bicarbonate of soda were given every quarter of an hour and a good quantity retained.

Fresh blood films were examined with the same result as on February 5, 1918. A twenty-four hour specimen of the previous day's urine was found to contain 3 per cent. glucose, slight albumin, no casts, and was alkaline? The constipation was treated with enemata and a pill containing codein gr. $\frac{1}{2}$, ext. cas. sag. gr. 1, and ext. nuc. vom. gr. $\frac{1}{4}$, ordered t.d.s. On February 8, 1918, he was much better. Urine was still alkaline, with a trace of albumin. The bicarbonate of soda was stopped and the pill only continued. On February 9, 1918, all his symptoms had returned, and his condition caused some anxiety.

His bowels were well open; his urine contained only 2·7 per cent. glucose, but the quantity passed was still small, and his pulse was very weak. There was still no enlargement of the spleen.

After consultation with one of my colleagues, who kindly saw him with me, we decided to give diuretics and cardiac stimulants, and the pill was stopped and a digitalis and nux vomica mixture substituted. On February 10, 1918, he was better in the morning, but his symptoms recurred in the evening. On February 11, 1918, all symptoms still persisted, and his condition was unsatisfactory. His urine was amphoteric with a trace of albumin, and no diacetic acid; fresh blood films were taken, and again showed no malarial parasites and no mononuclear increase.

Struck by the periodicity of the symptoms, I decided to try quinine, as several cases of malaria had occurred in the neighbourhood where he lived, and ordered 10 gr. in the morning. Five only were taken, and in the evening I gave him an injection of a further 10 gr. On February 12, 1918, patient was very much better, and all medicines were stopped except the injections of 10 gr. of quinine, which were repeated daily on the 13th and following days for a week, during which he made uninterrupted progress. On February 14, 1918, blood films showed for the first time subtertian rings and gametocytes. On February 17, 1918, a twenty-four hour specimen of urine contained 2·37 per cent. of sugar, was slightly acid, with a very faint trace of albumin, and no diacetic acid. On February 18, 1918, quinine by the mouth 10 gr. daily was substituted for the injections. On February 23, 1918, malarial crescents were still present in the blood, and the urine contained 3·6 per cent. sugar. On March 5, 1918, patient was still perfectly well; had had no more fever. Urine was acid, and contained 2·52 per cent. sugar. On April 13, 1918, patient

had had no further trouble. His urine was acid, no acetone present, and contained 2·48 per cent. sugar.

The absence of malarial parasites in the blood, with no mononuclear increase and no enlargement of the spleen and the presence of acidosis, were the causes that gave rise to the error in diagnosis. The blood films were all carefully examined by the same man, and whereas a most thorough search on the 5th, 7th, and 11th showed no parasites or mononuclear increase, parasites were present in abundance on the 14th. The only indication, therefore, of malaria was the periodicity of the symptoms.

THE PASSING OF BILHARZIA WORMS IN THE URINE.

By J. B. Christopherson, M.D., F.R.C.P., F.R.C.S.
Director of Civil Hospitals, Khartoum and Omdurman.
AND
J. R. Newlove.
Pathological Assistant, Khartoum Civil Hospital.

That bilharzia worms are sometimes passed with the urine is shown by the following case, but we are not aware that the occurrence is a frequent one:—

In the course of some work we were doing on bilharzia, an Egyptian, male, aged 19, native of Fayoum, Upper Egypt, came to the Civil Hospital, Khartoum, carrying a receptacle which contained about three-quarters of a pint of what appeared to be pure blood. He stated that he had passed this specimen whilst urinating before coming to the hospital.

He was requested to pass another specimen of urine in order that a fresh specimen might be obtained for microscopical examination. He did so, and on examining the urine after a short interval Mr. Newlove found a small worm, and on submitting it to the microscope he found it to be a coupled pair of *Schistosoma hæmatobium*. The ova found in the specimen were fairly abundant.

Perhaps the occurrence of bilharzia worms in the urine is more frequent than we know. Bilharzia worms are small and easily overlooked; they are about the size of the white distal free part of the nail of the little finger. They are frequently so numerous in the portal vein and its tributaries that it is difficult to see why they are not more frequently found in fæces or urine.

In this particular case the hæmorrhage was a large one, making the boy pale and faint, indicating that the vessel wherein the worms were situated was of some size, or at any rate not a capillary vessel.

The boy gave a history of bilharzia of some years standing, but he had never had hæmorrhage before April 15, 1918.

It is interesting to note that on examining it it was found to be a paired *Schistosoma hæmatobium*, showing that the ova are laid whilst the worm is in this condition.

Certain cases are recorded of worms having been passed with the urine, but if we exclude echinococcus and perhaps trichinæ and cases such as the present, it is not easy to believe that the worms have originated in the bladder.

Doubtless a recto-vesical fistula would account for a worm voided with the urine, and worms might conceivably also make their way from the rectum to the vagina, and eventually be found in the urine.

Hysteria and fraud perhaps account for a certain number of recorded cases.

Worms inhabiting the bladder may, however, be voided with the urine as in this case of bilharzia.

Chronic Parotitis with Iritis and Facial Paresis (S. Bang, *Ugeskrift for Læger*, April 11, 1918).—Fifteen cases of this clinical picture have been published since attention was first called to it in 1905 by a Danish physician. Two cases are described, a boy of 13 and a girl of 15. The subchronic iridocyclitis and parotitis extend over months, with low, remittent fever. Both eyes are usually affected, and in not less than five cases the outcome was total blindness. The parotitis was always bilateral, and in six cases there was simultaneous tumefaction of the lacrimal glands. This is without precedent, except in Mikulicz's disease (bilateral chronic parotitis and dacryoadenitis). It has recently been asserted that Mikulicz's disease is a form of pseudo-leukæmia, as all stages of transition have been observed between the pure Mikulicz's disease and extensive lymphomatosis. This throws light on the uveoparotitis cases, especially those with lymphadenitis. The enlarged spleen and the febrile course are analogous to the febrile forms of pseudo-leukæmia. The nodules in the iris may likewise possibly be lymphomatous infiltrations. Schou has reported a case apparently typical, except that the parotid glands seemed to be normal. The finding of giant cells and of epithelioid cells in the nodules in the iris in four cases was assumed at the time to indicate a tuberculous origin. The uveoparotid syndrome—until further light is obtained—is pseudo-leukæmia rather than tuberculosis. In any event, it is most certainly not a disease *sui generis*.

Petrolatomas (O. Jacob and Fauré-Fremiet, *Revue de Chirurgie*, No. 9-10. Published April, 1918).—Seven cases are reported of tumours developing after injection of camphorated oil, the "oil" used being liquid paraffin. The experiences on record with paraffin tumours should have warned against the use of petrolatum for the excipient. The tumours first became manifest from five to nineteen months after the injection. They did not modify the general health, but the pains from the tumours and their interference with the use of the limb compelled their removal in each case. There was recurrence of the tumours in every instance, evidently from some particles of the petrolatum left in the tissues. The tumours should be extensively excised.

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THE JOURNAL OF

Tropical Medicine and Hygiene

SEPTEMBER 2, 1918.

MEDICINE DURING WAR AND PEACE.

CONSIDERING the treatment the Indian Medical Service received at the hands of lay official control, professional advice ignored, and vexatious regulations, it is only naturally to be expected that medical arrangements were defective since the war. This largely if not mainly accounts for the disasters, mortality and invaliding in Mesopotamia. Equally important is the conduct of the East African Campaign. Mr. Macpherson, Under Secretary of State for War, who is also Vice-president of the Army Council, stated in reply to a question by Commander N. Craig in the House of Commons that a report by Colonel Pyke and Colonel Balfour in regard to the Army Medical Service in Africa had been received. The report, which was received in May, disclosed a very serious state of affairs in regard to Army medical administration. It had received immediate consideration and effective action had been taken. Mr. Macpherson declined to publish the report on the ground that it was of a personal and highly confidential nature.

It is just as well that the report is not published. All the facts are known to those engaged on active service, to civilian residents in East Africa, have been discussed in councils and commented on in the press. Besides, details are of minor importance; main principles are of greater importance. The Indian Medical Service largely concerned has many varied needs. First and most important, steps require to be taken that professional advice receives due and adequate consideration, that the profession should have a standing proportionate to its importance to humanity, to the lives and health of the nations over which it has charge. The Cameroon and West African Campaigns are ended, the East African would be ended by now if due consideration had been given to professional advice, especially if the Indian Medical Service occupied the position it is entitled to.

Sad though the past is, it is past; the only good that comes from evils past is to take care to be wise in future, that similar things do not happeu again.

The prosperity of India depends on power to develop the products of the earth: the crops, herds, and minerals. The vital centre of production is labour, and labour is impossible without health. Health depends on both preventive and curative measures. The scope of tropical medicine is wider and more varied than elsewhere, yet officials act as if one doctor is as good as another, seeming unable to appreciate that time is required to overcome the special difficulties of practice in hot climates. Nowhere is it more necessary than in India and Eastern countries.

The Indian Medical Service has been starved before the war, during the war, and as far as can be seen will be in the same position after, with the prospect that India will not occupy the rightful position due to its productive capacity being reduced by lack of foresight of the special needs of the country and lack of knowledge of steps necessary to increase its productiveness. It must ever be remembered that as India helps Europe, so Europe helps India. An increase of Indian prosperity helps Europe, especially in the near future when food and other necessaries will be so deficient, and the need to supplement raw materials will be greater than at any time in the history of mankiud. For this to be accomplished the needs of the Indian Medical Service brook no delay.

Annotations.

Brazil introduces State Quinine Service.—Professor M. Pereira has aroused the country with the cry "Brazil is a vast hospital." The movement for prophylaxis is on an extensive scale and the President of the Republic has appropriated 400,000 milreis for an official service of quinine in prophylaxis of malaria —necessary for the sanitation of Brazil—and providing for the organization of commissions of physicians to initiate the service of rural prophylaxis, combating the endemics which ravage the interior of the country. The President calls on every Brazilian to aid in this great campaign against endemic diseases in general. The success already attained in eradicating yellow fever in Rio augurs well for the success of the new drive. That it has not been started before, he says, is due to financial reasons.

Cause of Cretinism (Finkbeiner, *Correspondenz-Blatt für Schweizer Aerzte*, May 18).—Of 119 cretins in the Nollen district, 56 per cent. were males to 44 per cent. females. The smaller the villages the larger the proportion of cretins, as also of deaf-mutes and of conscripts rejected on account of goitre. The native-born furnish the overwhelming majority of cases. This seems to disprove the infection theory, as a pathogenic parasite could not distinguish between those born in the region and those moving in later. Healthy persons from other regions need not fear cretin offspring, not even when one parent is native-born. But a marriage between the native-born, even when both are healthy, is liable to yield cretin children, as there is usually some more or less distant blood relationship between the people in small, stable communities. Even moving to an endemic-free region does not avert this doom. It is not the place but the family taint that is responsible for the endemic. Immigration is absolutely free from danger, while emigration is no protection. Nothing was found in this district to sustain in any way the theory of water, soil, the thyroid, or infection as responsible for cretinism. The data all point to inbreeding, and that only by heredity can this form of degeneration appear in a family. Cretinism prevails in remote, shut-in communities, and it dies out when the place becomes accessible by a railroad, or when industries bring in new blood. This dying out of cretinism as transportation is improved is the reverse of what occurs with infectious diseases. For example, Chagas's disease (which has certain features resembling cretinism) has spread along the route of the railways in Brazil.

Benzonaphthol in Treatment of Goitre (Messerli, *Revue Médicale de la Suisse Romande*, April).—The goitres likely to be influenced by this means are the large soft goitres of the follicular, hypertrophic, and parenchymatous types. The dose is 0·5 grm. (7½ gr.) thrice a day. The circumference of the neck at three levels had grown smaller by 4, 6, and 4 cm. in one case and by 5, 5, and 1·5 cm. in another. The disinfection of the intestines has to be kept up continuously. It does not interfere with iodine treatment of the goitre. This experience confirms MacCarrison's statements as to the causal importance of intestinal abnormalities.

Epidemic Lethargic Encephalitis (A Netter, *Bulletin de l'Académie de Médecine*, May 7, 1918, and *Bulletins de la Société Médicale des Hôpitaux*, March 22, 1918).—Of fifty-four patients only thirteen were under the age of 13. The mortality was over 50 per cent., but the recovery seemed to be complete in those that survived. The disease may last only a few days or it may persist for weeks, or two or three months or more, the patients finally recovering when a fatal termination seemed inevitable, the sacrum, buttocks, spine and heels covered with eschars. Necropsy shows a diffuse interstitial encephalitis; the microscopic lesions resemble those of the trypanosoma sleeping sickness of Africa. Two previous epidemics are on record, one following the pandemic of influenza in 1890, and another in 1895, with cases reported from eight European countries and the United States. Netter insists that the disease cannot be a form of poliomyelitis, and its coincidence with influenza seems merely casual. There is nothing to sustain the assumpton of botulism. He gave hexamethylenamin, finding it in the spinal fluid soon after. Intraspinal injection of convalescents' serum seems to offer the best promise in treatment, but he had no chance to apply it, although he has reported the successful application of this principle in treatment of poliomyelitis (1914).

Massive Infarction of Spleen (D. G. Richey, *Journal of Laboratory and Clinical Medicine*, June).—A negro man, aged 35, was admitted to the hospital in a semi-comatose state. The only available history was that of a protracted deafness, and that the onset of his present illness had antedated his admission by eight days. There was no history or ante-mortem, physical, or laboratory finding which pointed to the presence of any splenic condition. The cause of death was directly referable to an acute suppurative meningitis (pneumococcic), the origin of which was an old otitis media and mastoiditis. The spleen was very atrophic, showing a large area of necrosis, fibrosis, and calcification, and two small peripheral masses of living splenic tissue surrounded by dense fibrous adhesions. The positive findings in the other viscera were coincidental to the acute infection of the meninges, save for the presence of many small gallstones. No focus from which an embolus could have arisen was found. No congenital abnormalities were evident.

Typhus and Influenza in Spain and Portugal.—There were only 159 cases of typhus at Oporto in the week ending June 8, which is a little larger figure than that of the preceding week but still represents a gradual decline of the epidemic. There had been no cases at Lisbon since May 29. The epidemic of influenza at Madrid is said to have attacked 200,000. It has appeared in other cities and in Portugal. The three-day course of the fever seems to be the universal type. Medical students at Madrid have been granted another examination as their last examinations fell just at the time when they all had influenza.

Cobra Venom Reaction in Diagnosis of Cancer (C. B. Farmachidis, *Riforma Medica*, May 18).—Activation by cobra venom of the hemolytic action of the serum in the deviation of complement test occurs only with serum from persons with malignant disease. With rabbit red corpuscles, a positive reaction was pronounced in fifty-three out of sixty-four persons with carcinoma. In eleven cases, the reaction occurred, but not until after the twentieth hour (between the twentieth and the thirty-fifth hours), and consequently was considered as negative. In sixty-two persons with tumours of benign character, fibromas, cystomas, &c., there was no trace of a positive reaction. 0·10 c.c. of a 1 per twenty thousand solution of the cobra venom, that is, one part of a 1 per five thousand solution of cobra venom in three parts physiologic saline is used. A higher percentage alone sometimes hemolysed guinea-pig red corpuscles.

Paresis of Malarial Origin (B. M. Van Driel, *Nederland Tijdschrift voor Geneeskunde*, Amsterdam April 20, 1918).—In three cases the discovery of the parasites of tertian malaria in the blood seemed to be the only possible explanation of the focal symptoms observed. In one they took the form of attacks of Jacksonian epilepsy with consecutive facial paresis. In the others there was spastic spinal paralysis or symptoms suggesting an abscess or tumour in the Rolandic area. In the latter case an operation was considered before the blood findings cleared up the diagnosis. In all the cases the cerebral or spinal manifestations subsided under quinine, confirming the malarial origin. In the first two the malaria was in a masked form at first, but later appeared as typical severe tertian. The train of symptoms in the first two cases certainly belong in the category of false brain tumours, though no text-book on neurology mentions malaria as a possible cause for such a syndrome. Wherever there is a chance for malaria to occur it should be suspected, whatever the clinical manifestations may be, and the blood should be examined.

Erratum.

Vol. xxi, Journal of Tropical Medicine and Hygiene, No. 8, April 15, 1918, p. 84, line 12 from top, "May" should read "April."

Abstracts.

HEAT STROKE.[1]

By P. McKenzie, and E. R. R. LeCount.

Inability of the air about the body to receive any more moisture because it is already so saturated, together with a high temperature of the air, are chiefly responsible for heat stroke, and this applies equally well to heat stroke caused by exposure to the sun's heat and to heat stroke under other conditions, as in hot kitchens or boiler rooms.

Less important causes are tight and heavy clothing and a too small intake of water, each preventing or lessening cooling of the surface by evaporating as well as adaptive changes in other heat-regulating activities of the body. Evidence that consumption of alcohol in beverages favours the development of heat stroke and increases the mortality has been advanced. Further evidence regarding this relationship is needed and especially from carefully controlled experiments. There is no evidence that actinic, ultraviolet, or other rays except those of heat, play any rôle in the causation of heat stroke from exposure to the sun's rays. Aron found that monkeys accustomed to tropical heat quickly died when exposed to the sun in still air; those in the shade of an umbrella or in the sun with a current of air from an electric fan suffered no damage.

The possibility of an infectious origin for heat stroke is discussed by Sambon. Some writers discuss the development of a poison as a consequence of the heat and altered metabolism, and liken it to snake venom, probably because hæmorrhages in the skin and elsewhere are observed in heat stroke. This poison may be protein and incompletely split from loss of water, concentration of the tissue colloids and changed metabolism, and also that such substances may cause the high fever.

Symptoms.

When heat stroke occurs in hot boiler rooms (heat exhaustion) or other similar places, there may be dizziness, nausea and weakness before unconsciousness; the attack may come on slowly; when more severe, profuse sweating, dryness of the mouth, a red or purple discoloration of the skin, shivering, and a subnormal temperature or one of from 100° to 102° F. which precede death in coma.

A fibrillary twitching of the muscles, vomiting, slow pulse, a more abrupt onset, earlier coma and high temperature of the body (105° to 117°) characterize heat stroke from direct exposure to the sun. (insolation). In this condition the attack may be indeed a stroke without warning, and has been repeatedly observed in soldiers making a charge in great heat. The simpler classification is asphyxial and hyperpyrexial; comatose, epileptiform and convulsive forms as well as forms without loss of consciousness, an encephalitic variety and a form with delirium are described.

Sometimes generalized fibrillary twitchings and painful cramps of the muscles are the only outstand-

[1] Abstracted from *Journ. Amer. Med. Assoc.*, June 27, 1918.

ing features resulting from hot weather and classifies this condition as a separate disorder; some were sequelæ. Direct overheating of the scalp and other coverings of the cerebrum account for the higher mortality and greater severity of isolation. An increase of cells in the cerebrospinal fluid, polymorphonuclear at first and mononuclear later, has been described.

Pathologic Anatomy.

There has been a great deal of discussion regarding the hyperæmia of the brain and leptomeninges, partly because the conditions rapidly change post mortem, and observations have been made naturally at varying periods after death; also in part because the observations reported have been of different types of heat stroke and of the brain and its coverings with death at different periods after the stroke or prostration. The minute hæmorrhages in the brain and these coverings are, no doubt, as fully responsible for the notice these structures have generally received, as any content-variation from normal of their blood-vessels. In places where it usually is observed, cloudy swelling is found in organs of the trunk, with hyperæmia; in the lungs, œdema. The few gross changes, therefore, like the usefulness mathematically of negative values, support any contention of death from heat stroke.

Œdema of the leptomeninges with varying amounts of cells in the transudate have led to the view that there is a serous meningitis with heat stroke. In the observations of microscopic changes in the brain, there is nothing characteristic of heat stroke, and as yet no general agreement regarding the alterations. In this connection changes found in the Nissl bodies by these observers deserve mention.

In post-mortem examinations made by us of the bodies of thirty-seven persons who died of heat stroke, the following alterations were found quite regularly: œdema of the brain or leptomeninges or both; marked generalized passive hyperæmia, especially of the brain and the lungs; œdema of the lungs; hyperplasia of the spleen; cloudy swelling of the liver, kidneys, and myocardium, and petechial hæmorrhages of the various mucous membranes and of the skin, with irregular and lessened yellow material of the suprarenal cortices.

Perhaps more interesting than other changes are the œdema of the brain tissue and the enlargement of the spleen; many standard text-books omit entirely mention of any change of the spleen. Hæmorrhages of the skin are common in that of the thorax, especially the sides below the axillæ.

In all the thirty-seven, the cerebrospinal fluid was clear, colourless and usually increased. Œdema of the brain alone was present in twenty-two; œdema of the leptomeninges alone in nine; œdema of the brain and leptomeninges in four; a foramen magnum pressure furrow of the brain stem in fourteen, and in three only hyperæmia of the brain and leptomeninges. In two of the brains there were minute hæmorrhages of the leptomeninges of the cerebrum, and in one barely visible hæmorrhages of fresh surfaces made by sectioning the pons. These three had diagnoses of heat prostration. In these brains, after hardening in solution of formaldehyde there was quite generally œdema of the brain substance, hyperæmia, especially of the white substance; punctiform red places due to hardened blood within minute vessels, and enlargement of the ventricles, especially the lateral; in some cases the lateral ventricles were 14 mm. in the greatest diameter at the anterior commissure, measured on segments made by coronal sections. In one brain, small softenings of the lenticular nuclei were found; the clinical diagnosis was heat stroke, and was well supported by the necropsy observations.

Because of the frequency and the seemingly marked œdema of these brains, an attempt was made to learn the amount of water present with more accuracy. At the time of the post-mortem examination, pieces were taken from the temporal lobes, one from each, and a separate estimate made for each. They were put separately into weighing bottles, the stoppers "locked" and the bottles and content placed in an ice-box until weighed. After weighing, the tissue was removed to a bottle containing redistilled 95 per cent. alcohol equal to two or three times the volume of tissue, and the tissue was then cut into small pieces. The weighing bottles were then weighed empty.

The water content of each specimen was estimated.

It is known that the gray matter of the brain normally contains a higher percentage of moisture than the white, and it has been found in experiments on swelling of the brain substance that the gray and white matters swell differently. The need of studying the hardened brains, as well as technical difficulties of estimating the water of the entire brain, led to taking only similar portions of each brain. The close agreement in water content found in the portions from each side of so many brains indicates a similarity of amount of gray and white matter on each side.

All of the brains studied were from adults. For comparison, similar portions of brains of adults dead from accident or crime when death came shortly after violence were examined in a like manner. An average of the percentage of water for these similar portions of control brains is 79·7 per cent. Some of these control estimates were from the brains of persons who had lost a great deal of blood; and with anæmia there is œdema of the brain. Notwithstanding this factor, the water content found agrees very well with the results given by others for the normal brain, considering also that their estimates are of the brain as a whole. As a dividing line it may be safely said that a percentage of moisture above 80 per cent. may be taken as above normal.

From the average weights of brains of Europeans between 20 and 80 years old, as found by twenty-six investigators working independently, the average weight of the brain of a man, 1,357 grm., and of a woman, 1,235 grm. Therefore, 1 per cent. of difference in the water content of brains equals with brains of men about 13·5 grm., with those of women 12 grm. With a 2 or 3 per cent. increase of moisture content of the brain in disease, if it does not replace other fluid, that is, if there is hyperæmia of the brain and meninges and internal hydrocephalus as well, it is very likely that compression occurs, with disturbance of function of first the cortical centres, and then the medullary; 3 per cent, is more than one fluid ounce, and the brain, unlike most viscera, has a firm wall about it.

The cases of heat stroke of 1916 are regularly of high water content. Of the sixteen brains estimated, thirteen have a gross diagnosis of marked œdema of the brain. Of the latter, nine patients died *en route* or shortly after admittance to the hospital and their temperature is unknown, except in one, in whose case it was 110° F. One of the remaining seven was in the hospital two and a half days with a maximum temperature of 109° F., the others from one to seven hours and with temperatures of from 110° to 111° F.

Of the heat stroke brains of 1917, for only one was there a high water content, for three a moderate increase, and for the other two the water content was within normal limits, apparently. The heat of 1917 was not as severe as in 1916. With fewer such patients in the wards and, in general, more hours in the hospital for the individual, the treatment may have lessened the moisture content of the brain; perhaps more resistant individuals were affected.

Numerous contributions to and reviews of the subject make it unnecessary to attempt here any direct application of the results of this investigation to what is perhaps inaptly termed "acidosis." The results seem to confirm the impression gained by finding, soon after death and by opening the head first, the brain swollen with flat convolutions and tightly closed sulci, the arachnoid meshwork obliterated, and the parietal and visceral layers of the arachnoid in intimate contact. This condition, always most marked on the vertex and sides of the cerebrum, as already stated is not invariably found with heat stroke; it is perhaps less constant than hyperplasia of the spleen. It does, however, deserve a place with the minute hæmorrhages and especially those of the skin, as one of the conspicuous alterations.

There are, however, in medical literature two observations which should be mentioned in connection with these results. One is the experimental production of high temperatures in dogs by dehydrating the animal by means of continuous injections of glucose.

The suggestion is that one fundamental factor in the maintenance of a uniform body temperature is the maintenance of a constant water concentration in whatever body fluids function in a way comparable to that of the salt solution phase in the system mentioned.

The other observation is an increased hydrogen-ion concentration of the blood with low barometric pressure, that is to say, with heated air or moisture-laden air or both.

Prophylaxis and Treatment.

In addition to such usual recommendations as a diet largely of carbohydrates, low in calories, with less of fats and proteins; the use of light, loose clothing and abstinence from alcohol; and to protect the head and avoid extreme muscular exertion in hot and humid air, emphasis should be made of the value of drinking water in the prevention of heat stroke.

Three gallons of water are required by a man working on a hot day in the sun. Troops marching in the sun on a hot breezeless day will be less likely to suffer from heat stroke if marching in open rather than in close formation.

When the attack is not severe or in early stages, removal to a cool place may be all the treatment necessary. With collapse and a subnormal temperature, heat externally and massage are advised. With hyperpyrexia, ice and ice-water are used in a variety of ways. A favourite method is to cover the stripped patient or a stretcher with a sheet kept cold by pieces of ice and by pouring ice-water over it. When the thermometer kept in the rectum indicates 103° or 104° F., the patient is removed to bed, wrapped in a blanket, and the temperature watched. Ice-water enemas may be used; also a spray of ice-water on the back. Camphorated oil and other cardiac stimulants may be useful. Physiologic sodium chloride solution subcutaneously was employed but its great value is improved. Removal of from 10 to 18 oz. of blood from patients after the temperature was reduced was often followed by improvement.

Solutions of sodium chloride and carbonate in water rectally and intravenously are advised. In those cases in which the symptoms have continued for days with coma, spinal puncture has been done with good results.

KALA-AZAR IN MALTA.[1]

By H. I. Winifred Kerr.

Kala-azar presents no special difficulty of recognition when looked for. In the early stages the diagnosis rests upon general weakness and wasting, with raised temperature, sweating, conspicuous splenic enlargement, and pronounced leucopenia, this consisting of a marked relative diminution of polymorphonuclears and relative increase of mononuclear cells. The characteristic temperature chart, with its double daily rise, does not become conspicuous until rather later. For confirmation of the diagnosis splenic or hepatic puncture is necessary. Relying upon the signs mentioned above, the diagnosis of yet a third case in one of the military hospitals was made within a few days of the patient first reporting sick.

The cases here recorded tend to confirm the value of tartar emetic in a disease regarded hitherto as of specially evil prognosis.

Case 1.—Sister B. Admitted to hospital January 23, 1917. Aged 29. Service 1 7 12 years. Had never been farther east than Malta. Patient arrived on island in July, 1915; enjoyed good health till November, 1916, when she began to feel tired and more weary than usual. Slight cough in January, 1917; on January 23 temperature 100·8° F. She reported sick. Nothing abnormal detected in heart or lungs. Abdomen moved freely; on left side was a mass, some doubt whether it was enlarged spleen or kidney. Urine acid; sp. gr. 1004; trace of albumin; a few granular and hyaline casts, no tubercle bacilli. She ran high temperature which began to show indication of two rises in twenty-four hours from February 12; occasional rigor. Blood negative to Widal's reaction; no

[1] Abstracted from the *Lancet*, July 13, 1918.

malarial parasites found. Diminution of both red and white cells; hæmoglobin fell from 52 to 30 per cent. Amenorrhœa for two months; no diarrhœa.

On findings of blood picture, the leucopenia, marked anæmia, suggestive temperature, with mass in left side, now undoubtedly an enlarged spleen, splenic puncture was advised; Leishman-Donovan bodies recovered. In neither case could these parasites be recovered from peripheral circulation, nor from serum of blisters.

On March 1 intravenous injections of 2 per cent. solution of antimony tartrate were commenced, and continued in increasing doses at four days' intervals, beginning with 4 c.c. The first injection ($\frac{3}{4}$ gr.) was well borne; no marked reaction. By March 21 blood picture had improved; temperature only slightly raised; patient had menstruated first time for three months. Spleen, which had been below umbilicus, had not altered much hitherto, but by March 24 lower border was $\frac{1}{2}$ in. above anterior iliac spine. About April temperature, which had been normal, rose to 100° F.; an injection given at once checked relapse. After first six injections intervals between had been gradually increased and had evidently become too long.

By May 31 spleen was only four fingers' breadth below costal margin; left kidney again palpable, low and enlarged. By June 5 spleen was not palpable, and remained so without further treatment. Regaining weight; no rise of temperature. Patient was subsequently returned home as a "walking case," and has now, we understand, resumed duty in a military hospital in England. She had 246 cg. of tartar emetic.

Case 2.—Corporal C. Admitted Military Hospital, Imtarfa, February 18, 1917. Aged 28. Service 3 1 12 years. Foreign service: Egypt, September, 1914-August, 1915; Gallipoli, August, 1915-October, 28, 1915; Malta, November 3, 1915. Patient's health good during year in Egypt, and in Gallipoli till invalided with amœbic dysentery in October, 1915. On recovery stool examined at Camp Hospital; found to be carrier of *E. histolytica*. He was treated from May till July, 1916, at Imtarfa Hospital, being discharged back to Camp Hospital on July 9, 1916. There he became a "convalescent employed" on orderly-room staff. There were plenty of fleas about, and a dog attached to the orderly-room slept frequently on his bed and had special attention, as it was then suffering from "distemper."

About the end of 1916 patient began to feel very tired; was getting thinner. In January, although taking quinine, 10 gr. daily, temperature rose. In beginning of February he was having 20 gr. daily; temperature not controlled. Eventually he was sent into hospital again as case of P.U.O. Nothing abnormal in heart or lungs. In abdomen tumour below left costal margin, about hand's breadth downward. It was not tender; apt to vary in position. Patient markedly emaciated; a curious greyish complexion. Carefully charting, it was noticed that temperature rose twice in twenty-four hours, often as high as 104° or 105° F. No symptoms of dysentery; stool reports negative. Quinine given intramuscularly; no effect on temperature. Blood did not agglutinate dysenteries, typhoid, paratyphoid bacilli, nor *Micrococcus melitensis*. No malarial parasites found in films taken; marked leucopenia and anæmia. These, with spiking of temperature and enlarged spleen, led to suggestion of splenic puncture. On account of extreme debility hepatic puncture was resorted to and *L. donovani* recovered.

On March 7 treatment by tartar emetic in 2 per cent. solution (normal saline) was commenced with 4 c.c. intravenously, increased by 2 c.c. and given every three days, till 10 c.c. were reached. Marked general reaction each time. Reactions, with patient's debility and nervous condition, induced one to try $\frac{1}{4}$ gr. of morphine and $\frac{1}{30}$ gr. of strychnine hypodermically, twenty minutes before injection. This had a good effect, quieting general reaction of coughing, retching, and hysteria, and abolishing entirely rigor which used to come on about two hours after injection. The 10 c.c. dose had to be given within at least 60 to 90 seconds, or coughing and retching would begin, and it became impossible to keep needle directly in vein. Tartar emetic causes an intense inflammation should any escape, followed by cold abscess. Two of these occurred, but cleared up with treatment. There is less reaction when solution is heated to blood heat.

By March 26 patient was being given 10 c.c. doses of tartar emetic, 2 per cent. solution; condition critical. Temperature still rose to 104° F. twice daily; pulse 120. Heart sounds fairly good; no dilatation or murmurs. His condition got steadily worse. He suffered greatly from night sweats. As condition was desperate, drug was pushed to its limit, and on March 31 12 c.c. of solution were given, followed by 10 c.c. every other day until April 16, when temperature rose once only to 101° F. General condition much improved. Temperature did not rise again, and as his arms were very sore and suitable veins were not obtainable elsewhere a week's respite was allowed, during which time temperature did not rise. Veins showed signs of inflammation at previous punctures where the solution had been given. 10 c.c. and then 6 c.c. were given at intervals of a week, but temperature rose again with a smaller dose, with drowsiness and lack of appetite. On May 27 he was given 10 c.c. and then 9 c.c. of solution at interval of three days. This controlled relapse and two more doses completed this treatment. The spleen by July 11 was only just palpable below costal margin.

During treatment patient suffered from no skin eruptions nor rashes, no gastric disturbances, no diarrhœa, and no ophthalmic symptoms. He was transferred to England as a "walking case," and writes that he has now taken up former occupation. Except for the melancholy and depression, the antimony had no toxic effects, though given in such large and frequent doses, also no return of dysentery. Altogether he had 424 cg. of tartar emetic.

RETROPHARYNGEAL ABSCESS.[1]

By C. Rush.

No history of the disease can be given. The unclaimed body of a baby, aged 2 years, became the property of the State anatomical board, and was delivered for scientific purposes. The preservation being poor, the body was valueless for routine study. A midsagittal section was made after hardening the body in solution of formaldehyde. This disclosed an abscess measuring 3 cm. in length and width in the retropharyngeal space. It extended forward 2 cm. to the uvula and epiglottis, completely obstructing the pharynx and larynx. The abscess cavity was much shrunken by the action of the formaldehyde, and in the living state was, doubtless, much larger. An examination of the body gave no definite clue as to the cause of the abscess. A prominent pharyngeal tonsil was present.

The development and course of retropharyngeal abscess is better understood if one keeps in view the different layers of tissue that intervene between the pharynx and the cervical vertebræ.

Dorsal to the mucous membrane of the pharynx is the pharyngeal fascia loosely attached, permitting of free movement and free swelling. Next the constrictor muscles, covered by the thin buccopharyngeal fascia, loosely attached by areolar tissue to the strong prevertebral fascia which follows. The loose areolar tissue space—the retropharyngeal space between the thin buccopharyngeal fascia and the strong prevertebral fascia—permits of free expansion. The strong prevertebral fascia covers the prevertebral muscles which overlie the cervical vertebræ. When pus forms dorsal to the prevertebral fascia and is confined there extension must be limited, whereas, if present ventral to the fascia, in the loose retropharyngeal fascia space, the freest extension is possible.

The source of infection leading to retropharyngeal abscesses are classified under four headings:—

(1) Those due to caries of the upper cervical vertebræ, usually of tuberculous origin. Such an abscess, being dorsal to the prevertebral fascia, is very apt to burrow laterally and appear as a tumour in the neck, dorsal to the sternocleidomastoid muscle, where it should be opened under the strictest asepsis to prevent a mixed infection. If unopened, it may follow the brachial plexus into the axilla. Regardless of the pervertebral fascia, it may, however, burrow forward in the midline of the pharynx.

(2) Those due to an otitis media. The pus probably burrows downward in the upper part of the Eustachian tube along the tensor tympani muscle to terminate behind the prevertebral fascia. It tends to point in the same direction as infection from cervical vertebral caries.

(3) Those due to an extension inward of a carotid abscess.

(4) Those due to infection of the lymph nodes of the retropharyngeal space. These nodes are one or two in number on either side of the midline opposite the lateral masses of the atlas. They receive lymphatics from the nasopharynx, Eustachian tubes, nasal fossæ, and accessory sinuses.

These abscesses are in front of the prevertebral fascia, and usually, as in the case reported, point into the pharynx. They simulate croup, laryngeal diphtheria. If not opened they cause dyspnœa, dysphagia, and dysphonia, and probably death from suffocation. Or the abscess may rupture and the pus be swallowed or drawn into the larynx, causing death from suffocation, or septic pneumonia may result. As the retropharyngeal space is composed of loose connective tissue extending downward behind the œsophagus to the posterior mediastinum, failure of evacuation permits the abscess to follow a course of slight resistance downward into the thorax. Abscesses in the pharynx should be opened in the midline, while the baby's head is held sufficiently low to allow the contents to flow out of the mouth.

[1] Abstracted from *Journ. Amer. Med. Assoc.*, July 20, 1918.

ON THE DIFFERENTIAL DIAGNOSIS OF THE DYSENTERIES.

By J. Graham Willmore,

and

Cyril H. Shearman.

The pathology of histolytica amœbiasis is a primary degeneration due to the chemical digestion of the cells in the *immediate* neighbourhood only of the amœbic enzyme. It is not a primary inflammation with consequent degeneration; any inflammation which occurs is due to secondary microbic infection, is generally not severe, and takes place late in the disease.

The cell exudate in the stools and in the uncontaminated liver "pus" indicates the basal fact of its pathology.

The characteristics of a "simple" amœbic stool are:

1. Scantiness of cellular exudate, especially the polymorphonuclear element.

2. Preponderance of mononuclears over polymorphonuclears.

3. Evidence of proteolytic digestion of the cells, beginning at the periphery and affecting the nucleus last.

4. Absence of all phenomena characteristic of inflammatory reaction, toxic necrosis and consequent autolysis.

The characteristics of a bacillary stool are:

1. Abundance of cellular exudate, mostly polymorphonuclear.

2. Preponderance of polymorphonuclears over mononuclears.

3. Evidence of toxic necrosis of cells, the degener-

[1] Abstracted from the *Lancet*, August 17, 1918.

ative changes occurring early in all parts of the cell, including the nucleus. This degeneration may go so far as to leave only the circular periplast of the cytoplasm, thus constituting the "ghost-cell," the presence of which in any quantity is very typical of bacillary infection.

4. Evidence of phenomena characteristic of intense inflammatory reaction to microbic infection.

Reviews.

MEDICAL REPORT OF THE RICE EXPEDITION TO BRAZIL. By W. T. Councilman, M.D., and R. A. Lambert, M.D. Cambridge: Harvard University Press. London: H. Milford. 1 dollar 25 cents, net.

This work is essentially a medical survey of the Amazon Valley, indicating the risks to health and consequently commercial enterprise. The author's knowledge is entirely first hand. He seems to be unacquainted with the many physicians, who like himself have made short journeys in the district, for example one line of steamers sent, and perhaps soon will again, regularly four boats a month as far as Manaos, and two as far as Iquitos, having on board surgeons usually with a tropical experience. The book should be studied by all who contemplate going on the Amazon, both professional and lay, and one might suggest that stress should be laid upon the danger of the region to women, for whom there is the danger of unforeseen haemorrhage, and home life with the amenities of domesticity are impossible. Also it must never be forgotten that the Amazon is the home of galloping beriberi, for which the only hope is to leave the district at once. The author, both in Brazil and Porto Rico, has strong views on the question of slavery and wagery. He suggests that there was an exodus before the war from the Southern States of America in order to find homes where slavery could continue. It is true that many left after the war to avoid the evils of wagery, which the author depicts in a lurid light as now existing in Porto Rico.

DIABETES: ITS CAUSATION AND TREATMENT. By Lieut.-Col. Waters, I.M.S., pp. 164. Thacker, Spink and Co., Calcutta. Price Rs. 4.

A good advocate for the Allen Reduced Diet System of Treatment, and evidently written by one who has used his great power of observation to advantage. It is to be recommended to all who take an interest in this subject, as eminently practical, especially useful for Tropical and dietetic hints.

MEDICAL ELECTRICITY. A Practical Handbook for Students and Practitioners, by the late Dr. H. Lewis Jones. Edited by Dr. L. W. Bathurst (Seventh edition). Pp. xvi-588, demy 8vo. H. K. Lewis and Co. Ltd., 136, Gower Street, W.C. Price 15s. net.

This book, thoroughly brought up to date, maintains its high reputation as the best book on General Medical Electricity. Too often the curative application of electricity is left to quacks and camp followers of medicine, because the slight effort needed to master the details is not made, as in the case of ionic medication, diathermy, even epilation for ladies merits consideration. Electricity in general diseases, from anæmia or debility, gout, rheumatism, and many other conditions is markedly efficacious. For new growths, including rodent ulcer, in all cases it is beneficial at some stage, and bids fair to be the treatment of the future. For the diagnosis and treatment of the nervous system, brain, cord and nerves a sound knowledge is necessary. The late author has established reputation by a previous edition, the present author has maintained the reputation.

CHEMISTRY FOR BEGINNERS AND SCHOOL USE. By C. T. Kingzett, F.I.C., F.C.S. (3rd enlarged edition), Pp. 211, 81 illustrations. London: Baillière, Tindall and Cox. Price 2s. 6d.

This book may be considered as planned on distinctly original lines. It gives a safe foundation for the knowledge of chemistry. It is a book to be studied and learnt. An aid to teachers as an outline of lectures, of use to students to establish and confirm the knowledge acquired in lectures and practical demonstrations. It avoids the error of so many text books of being entirely elementary, but on the other hand it deals with the first essentials of the knowledge of chemistry. It is the kind of book that one can well imagine a lawyer getting up for the purposes of cross examination, and will be equally useful to those who will be cross examined on elementary knowledge which has somewhat faded from memory.

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Original Communications.

A DENGUE-LIKE FEVER IN DUTCH GUIANA.

By C. Bonne.

Paramaribo.

No dengue or fever allied to dengue has ever been described from Dutch Guiana. In 1917 I observed, in the Government Hospital at Paramaribo, several cases of a benign fever of short duration of the dengue type.

The onset was sudden, with flushing of the face, hyperæmia of the conjunctivæ, "watery eyes" and severe headache, localized in the frontal region. The face was not only flushed but also swollen, with œdema of the eyelids, especially in children. There were pains in the limbs and joints, in the first place in the knee-joints and along the tibiæ, sometimes also in the fingers, an elbow, a shoulder, and often in the back. As a rule these pains were not severe, many patients not complaining of any pain at all. The headache was nearly always present. In a few cases these pains continued during convalescence, as a rule they disappeared with the fever. They never were so severe as described in the typical cases of dengue. The fever did not begin with a rigor. There often was some chilliness, and this was also noted during the following days of the disease. Sometimes an initial rash was present on the face, the chest, and the arms. A well-defined macular eruption was the exception, and as a rule only redness of these parts was observed. It was absent in many cases.

In a well-developed case the temperature rose to 38·5° C. (102° F), or even 40° C. (104° F.), and the patient felt himself very ill.

According to the temperature chart, three types of the disease could be distinguished:—

(1) The ordinary form where, after two or three days, there came an intermission of the temperature to the normal (Chart I), or only a remission (Chart II). Then a new rise of temperature appeared, often even higher than on the first days of the disease and on the end of the fifth, the temperature came down by crisis, often continuing on the sixth day. Sometimes the crisis began on the sixth, instead of on the fifth day.

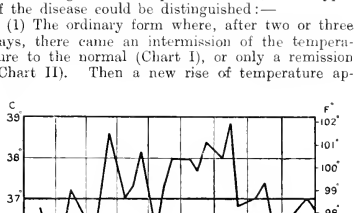


Chart I.

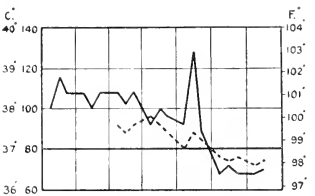


Chart II.

The second rise of temperature was often, but not always, accompanied by a general exanthem, sometimes macular, something more confluent as in scarlet fever, sometimes a more elevated eruption as in urticaria. This terminal rash lasted from a few hours to a week. There was no desquamation, but often itching. The colour of the eruption was light red, which was visible even in pigmental skins, as in immigrants from Java. Only when it lasted for many days it changed to a darker red colour. It began on the dorsal surface of the fore-arms, and as a rule spread all over the body, even the palms of the hands and the soles of the feet being involved. Sometimes, however, it was restricted to the arms and the chest.

The remission of the temperature was only very slight sometimes, as in Chart II, but other patients showed complete intermissions of two days or longer. Chart III shows a case of two days of fever, separated by three consecutive days of apyrexia.

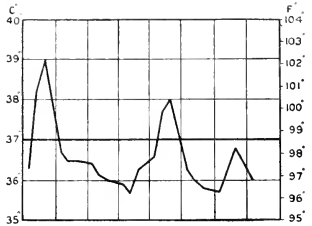


Chart III.

I observed one patient, where the period was two days, simulating quartan malarial fever, which, however, could be absolutely excluded. The terminal rash lasted a week in this case, and malarial parasites were absent (Chart IV).

I saw not infrequently that after the crisis the temperature became subnormal, as is shown in Charts III and IV, still more marked in Chart V;

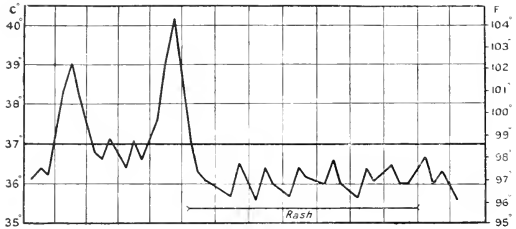


Chart IV.

even in the intermission in some cases the temperature came down below normal (Chart III).

(2) The second type of fever was rare. I only saw two cases. Here the fever did not end by crisis but by lysis. The total duration of the fever was then about ten to fourteen days. There is

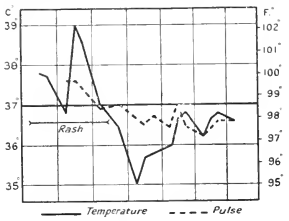


Chart V.

no doubt, however, that these cases represented a form of the same disease as the above mentioned. In one of them a typical terminal rash was present. No other explanation could be found for these cases of fever (blood-films without parasites, blood cultures and Widal's reaction, &c., negative). They appeared under the same conditions and together with cases of the ordinary type (Chart VI).

(3) In the third type the terminal rise of temperature was absent, the fever resembling "three days fever." Cases of this type were also few in number, but they are easily overlooked. The diagnosis of these cases was based principally on the typical symptoms of the onset, on certain blood changes, which will be described afterwards, and on epidemiological evidence. Blood-sucking phlebotomes, though present in the interior of the colony, are absent in Paramaribo, where nearly all the patients were living (Chart VII).

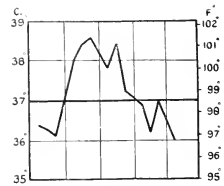
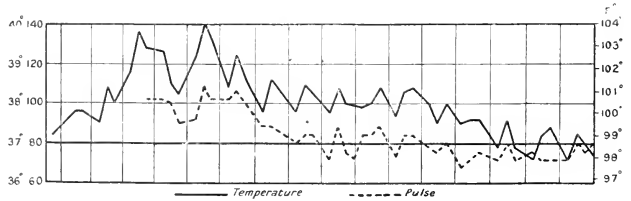


Chart VII.

In all the three types there usually was a relatively slow pulse, as is shown on some of the charts. Albuminuria, icterus, and gastro-intestinal symptoms were invariably absent. The tongue was thickly coated, anorexia and *fœtor exore* were often



Char VI.

present. The quantity of urine was somewhat diminished. There were no symptoms suggesting involvement of the respiratory tract, except in a few cases where a short dry cough was occasionally noted. Some of the patients were very restless, but I never noticed a complete delirium. Enlargement of the spleen was not found. In some of the cases a slight enlargement of the lymphatic glands was present.

convalescence. There was a neutropenia, especially of the neutrophile polymorphonuclears with segmented nuclei; the lowest number of neutrophiles was 9 per cent. in a case where there was also eosinophilia due to ankylostomiasis. The Arneth count showed a very marked deviation to the left, increasing till the fifth or sixth day in typical cases. The absolute number of the neutrophiles was also much diminished. Mast-cells were present in the

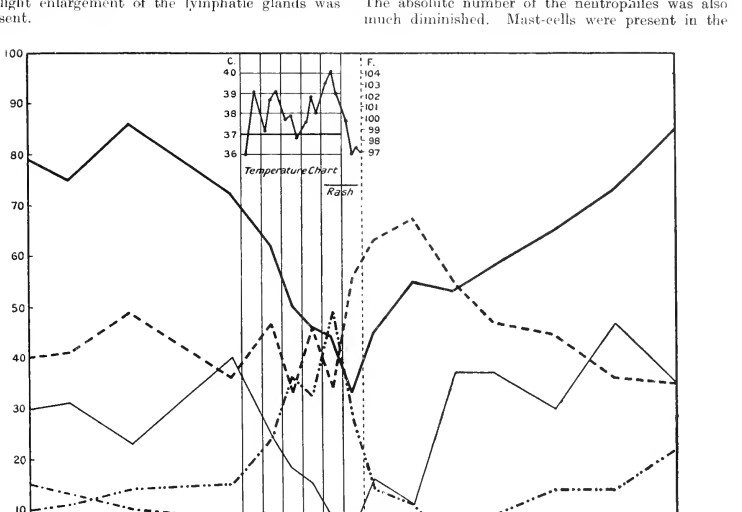


Chart VIII.

Chart showing the total number of leucocytes and the differential blood-count in percentages in a case of the dengue-like disease in Paramaribo. Javanese immigrant, also yaws and ankylostomiasis.

A most constant symptom was a definite leucopenia, the lowest number of leucocytes found being 2,300. This leucopenia began sometimes as early as the first day, and the lowest number of white blood corpuscles was reached on the fifth or sixth day in the ordinary type of the disease. The lymphocytes were always relatively increased. The highest percentage noticed was 73 per cent., but the absolute number of lymphocytes as a rule was normal or subnormal. This relative lymphocytosis reached its maximum during the first few days of

usual low numbers, but often they were not found at all. The eosinophiles were frequently present in high percentages, because so many people in Surinam harbour worms. In a few cases, however, where I made differential counts before the beginning of the disease, the eosinophiles showed a diminution. I saw three of these patients, where they disappeared completely on the fifth day. But this is not a general rule, for in other cases with helminthiasis they did not disappear, and in a few cases without a worm infection I even noticed rather

high percentages, e.g., 4 per cent. Large mononuclears and transitionals put together after did not change very much in numbers, but in other cases there was a slight increase, but never higher than 15 per cent., and only seldom more than 10 per cent. Sometimes some of the mononuclear cells of the lymphocyte, as well as of the large mononuclear type, showed a very basophilic staining protoplasm with vacuoles (part of them were plasma cells).

Chart VIII shows the changes of the differential count of the leucocytes and the total number of white blood corpuscles on different days in the case of an immigrant from Java, who was also suffering from yaws and ankylostomiasis, and who contracted the fever during her stay in the Government Hospital in Paramaribo. The neutrophiles are divided into two groups, one with segmented nuclei (where only thin threads connect the fragments), and the other with unsegmented band or worm-like or more rounded nuclei. It is easily seen that the first group diminishes, while the second increases in number during the disease. The numbers of these two groups of cells are also given in percentages of the total number of white blood corpuscles in the same way as the lymphocytes, &c. Basophiles were only found on the first two blood examinations on October 19 and 21.

As examples of the blood-picture in uncomplicated cases, I give the differential count of two European nurses on the day of the crisis (Temp. Charts II and V).

Neutrophiles with unsegmented nuclei ...	38 per cent.	...	28·5 per cent.
Neutrophiles with segmented nuclei ...	5 ,,	...	31·5 ,,
Eosinophiles ...	0 ,,	...	0 ,,
Basophiles ...	0 ,,	...	1·5 ,,
Lymphocytes ...	41 ,,	...	31 ,,
Large mononuclear and transitionals ...	12 ,,	...	7·5 ,,

Not only the white, but also the red blood corpuscles, show some changes in this disease. Many of them, but only in some of the patients, are polychromatic, or even show basophilic dots. Some of the red blood cells show a very minute chromatin dot, as often occurs in degenerative blood, especially in the polychromatic erythrocytes.

No parasites of any nature could be found in the blood.

All the well-developed cases I saw were in newly-arrived individuals or in children. I made most of my observations on European soldiers and Javanese immigrants, who had arrived during the last few years, and who were brought to the hospital for another disease. During a few months I was almost sure that any of them that came to the hospital would contract the disease in about two weeks, it did not matter much whether they slept under a mosquito curtain or not. Still this is not proof against an eventual transmission by mosquitoes, the hospital buildings are not mosquito proof, and one can be bitten during the day and in the evening. Mosquitoes are present in abundance, and amongst them the two species which are looked upon as possible transmitters of dengue and dengue-like diseases, viz., *Culex faniquefasciatus* (*Culex fatigans*) and *Aedes argenteus* (*Stegomyia calopus*). I had no opportunity for conducting transmission experiments with mosquitoes in a part of the colony free from the disease, which was widely spread and not confined to Paramaribo. Injection of patients blood into guinea-pigs did not produce fever or leucopenia during the ten days of observation.

In the hospital there were only three European nurses, two of whom arrived in 1915 and one in 1913, and perhaps a hundred Creole nurses and other employees. The three European nurses all contracted the disease in typical form, but none of all the other employees acquired it in such a form that it could be recognized clinically. One of the Creole nurses, who attended many of the patients, had fever for one day only. She showed a marked leucopenia (4,100), which was still present four days afterwards. I also found a leucopenia of 5,000 in one of the black boys, who told me he had some fever a week before, which did not prevent him doing his work. This does not prove, of course, that they really had the dengue-like fever, but it appeared possible, and even probable, since no other reason for these fevers could be found.

Anyhow, among the Creole negro and mulatto population no well-developed cases occurred, and they could be looked upon as at least relatively immune. Racial immunity not being much "en vogue" nowadays, I tried to trace this back to an immunity acquired in childhood, and it really appeared that the young mulatto children were not immune at all. I dare not say the black children, because in young children the differential blood-count is not of much use, which makes the diagnosis rather difficult and only possible with certainty when the terminal rash was present. Now this rash is not visible in a black skin, but it could easily be detected in the lighter skins of the mulatto children. The temperature chart was also typical for the disease, sometimes the fever beginning suddenly, ending with crisis, showing a remission and lasting five or six days. Measles and similar diseases were absent.

So the immunity of the Creoles was an acquired immunity. In the general opinion, however, dengue and the dengue-like diseases do not produce a long-lasting immunity; but there is no reason why the Creole people may not be infected several times, provided that it could be proved that the disease was not a newly imported disease, and that it had always been present in the colony, though perhaps in a form which could only be recognized with difficulty. It had struck me, when consulting old histories of soldier patients in the hospital, that now and then, perhaps once or twice a year, a case of measles or scarlet fever had been diagnosed amongst them. This was rather strange, because they were always isolated cases, no other cases of these diseases preceded or followed them. They always occurred in newly arrived European soldiers, and never in Creole soldiers. The temperature chart was typical for the above-described fever, and catarrhal symptoms or angina were absent. I do

not hesitate to identify these cases, of which I have seen a few myself in previous years, with the dengue-like fever. A good number of "influenza" cases, with a similar temperature chart (a disease which also seems to have preferred the young European soldiers as its victims), have apparently also been wrongly diagnosed.

Thus the disease appears to be endemic, and in 1917 has claimed a greater number of patients than in previous years. Amongst the soldiers, where it could easily be controlled, I only saw a second attack or relapse occurring six months after the first. But I am not certain that this second attack, which occurred in a malaria convalescent, was in reality an attack of the dengue-like disease. There was no rash, the fever lasted only three days, and the patient took quinine on the first. Malarial parasites, however, had not been found before the dose of quinine and the leucopenia was marked. But this can also be the case in a malarial attack.

With regard to the aboriginal Indians, East Indians and Chinese, I have no certain opinion yet as to their immunity. I did not see a single case amongst them, but this may be partly due to the fact that I did not observe any newly-arrived Chinamen or East Indians. The Javanese immigrants from Java contracted the disease in the typical form. This is interesting, because in Java dengue and one of the dengue-like fevers (Van der Scheer's fever, or five days fever) exists.

As to the diagnosis of the disease, it differed from yellow fever by the absence of icterus, hæmorrhages, and albuminuria; from measles, by the absence of the catarrhal symptoms and by the fact that it attacked fully-grown Europeans, some of whom had already had measles in their childhood; from German measles and the fourth disease, by the severity of the symptoms and the preference for Europeans and immigrants; from influenza, by the rash, the absence of bronchitis, and the same preference, which also distinguishes it from scarlet fever, together with the absence of angina; from "three days" fever, by the absence of blood-sucking phlebotomi and the duration of the fever. There is very much resemblance with dengue, but the pains are less severe and recovery, as a rule, was rapid. It also did not spread rapidly. I recognized the first cases in May, 1917, and saw a few cases in each month up till the present moment (February, 1918). The native population, except the children, was at least comparatively immune, and the disease was endemic. Greater still than with dengue was the resemblance with some of the dengue-like fevers with Rogers's seven days fever of India, Deeks's six days fever of Panama, or van der Scheer's five days fever of Java, which do not always last seven, or six, or five days. Similar fevers have been described from other parts of the West Indies, e.g., the red fever of Caracas.[1] One who calls all these fevers dengue can also include the fever of Paramaribo under this heading. To me, however, it seems better to separate these fevers from the true dengue until the causative organism is found and differentiation made easier. There is a most striking resemblance between the epidemiology of this disease and that of yellow fever, which makes one ponder very much as to the possible identity of both. The last epidemic of yellow fever in Surinam occurred in 1908.

[1] Fonesca (Manuel A.): *Gaceta Med. de Caracas*, 1915, January 31. *Tropical Diseases Bulletin*, 1915, vol. v., No. 6.

Diagnosis of Echinococcus Cysts (J. Bacigalupo, *Semana Medica*, xxv, No. 9).—Urticaria, which often accompanies echinococcus disease, is evidently a manifestation of absorption of toxins. It is possible to induce a characteristic reaction in sound skin by treating it with the toxic substances from an echinococcus cyst, if the subject is already sensitized by echinococcus disease. The most instructive reaction of the kind was obtained with fluid from an echinococcus cyst, the fluid kept in a cold place for a year and filtered just before using. One drop was injected by the intradermal technique. With a positive reaction, a papule forms with a red and painful halo and subcutaneous œdema, the whole reaching its height in thirty-six or forty-eight hours. The painfulness may keep up for four or five days. The allergy responsible for the specific reaction may persist for two or three months after the cyst has been extirpated. In the normal subject there may be a papule, but it is not painful, and soon subsides without redness of the skin. In one of twelve cases, all giving a positive reaction, the cyst had suppurated.

Death from Volvulus caused by Roundworms (J. F. Kendrick, *Medical Record*, July 13).—A child 4 years of age was given 6 minims of oil of chenopodium. Two days after the administration of the chenopodium the child was reported very ill. There was marked distension of the abdomen, with severe pains, frequent vomiting, and the bowels had not moved since the day treatment was given. On post-mortem a mass of roundworms the size of a man's fist was found blocking the bowel; the intestines below the mass were so twisted as to cause complete obstruction; there was local peritonitis in the vicinity of the obstruction, and more than 300 roundworms were found in the intestinal canal.

Life-cycle of the Schistosomum.—After three years of extensive research in northern Brazil, Professor A. Lutz (*Memorias*, Instituto Oswaldo Cruz) has traced the life-cycle of *Schistosomum mansoni* from the lateral-spined ovum to the adult parasite, through the intermediate hosts, fresh-water snails, to the definite host, rabbits, guinea-pigs and man, and reproduced the clinical picture. As this parasite is not known in southern Brazil, the commission had to seek it in its haunts along the rivers of the north. Bahia is a stronghold of this parasite.

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THE JOURNAL OF

Tropical Medicine and Hygiene

SEPTEMBER 16, 1918.

MEDICINE AND SCIENCE.

PROFESSOR CHAUDHURI, in his book "Sir William Ramsay as a Scientist and Man,"[1] directs attention to the benefits conferred on humanity by science by the aid it gives to the promotion of healthy and material prosperity. At the same time a somewhat sad note is struck by the official neglect of science, which, if anything, is more marked in India than in England.

He quotes the statement of Sir William Ramsay that "the status of chemists in Government employment is not such as to induce any young man, who can choose any other profession, to devote himself to the career of an official chemist." The reasons for neglect of science in India is partly due to competitive examinations for admission to the Government service, where low marks were given for science subjects. So few with a knowledge even of the elements of science enter the service. Also, the climate and environment do not tend to promote powers of accurate observation. In a book by an Indian official, two pages only, which contain all he knows on the subject, are devoted to reptiles; the information is given that "the cobra consists of eight varieties, but all the varieties form one species. Only about half the varieties have spectacles." The future officials need a more scientific training to enlarge their mentality to enable them to appreciate moral responsibility.

If the book promotes a greater interest in science generally and chemistry in particular amongst Indian officials it will have served a useful purpose; it is well worth perusal to show that science knows no special home, but confers benefits over the whole world. In India there are special needs. The natives live and prosper under circumstances impossible in Europe, where the climate demands better and warmer houses, thicker clothing. Simple though the native diet is, unscientific changes lead to serious consequences, to scurvy, beriberi, and varied bowel complaints. The natives know in a crude rough-and-ready way what is best for him, for her, and for their children, for they have learnt by long traditions often inculcated as religious principles.

It is a matter for regret that officials do not have the same knowledge of native sentiments as have doctors who come into intimate contact with the residents. This point is brought out in "Tropical Surgery and Diseases of the Far East."[2] The author has had a long and varied experience in China, the Philippines, and other Eastern countries. This is a book of prime necessity to all who practise in the Tropics, and who—as most doctors do—see patients from the Tropics. The author devotes considerable space to native customs and their bearing on surgery; this is specially important in gynæcology and obstetrics. To take an example. Without knowing anything about the relations between rats and plague, the cat is looked on as a sacred animal, because where cats flourish there is no plague. Contrast this with the unthinking females in England, who show their feelings by having the male cats castrated, and then being ignorant of the elements of diet, feed them on cream and lean beef, with the result that they vomit

[1] Butterworth and Co., Calcutta, p. 66, 1.8 rupee.

[2] John R. McDill. London: H. Kimpton. 24s. net.

and otherwise befoul the property of others. And this is done where a sanitary inspector is supposed to exercise control over the food supply to prevent waste.

At present efforts are being made all over the world to confer the benefits of science in ever increasing extent; this means more work for students of medicine and all science, but will confer untold benefits. In the scientific programme medicine—the pivot profession—must be allowed to play its part without being hampered, as it has been in the past, both in India as well as in England.

Annotations.

Spirochæte Jaundice (E. Bravetta, *Policlinico*, May 26).—The clinical picture is compiled from hundred of cases. There is an incubation of a week or two, then the period of invasion, which lasts from two to six days, with fever usually so slight that it is not noted, but there is no jaundice, although there may be intense muscular pains, suggesting rheumatism, or digestive disturbances with headache, suggesting typhoid. Then follows the stage of jaundice, during which the temperature drops to normal or even below, and the pains subside. There is usually an interval of a day between defervescence and the onset of the cholemia. It is accompanied by weakness, at times extreme, the spleen and liver enlarged. A special feature of the disease is that the temperature runs up again after an interval of from four to six days. The glands also swell, especially in the right axilla. There were no hæmorrhages from skin or mucosa in the cases, but a tendency to rhinorrhagia was common. As the jaundice and albuminuria subsided the depression was extreme, with vague pains, low blood-pressure and brownish tint of the skin, and the prostration and convalescence are long protracted.

Metabolism in Malarial Fever (D. P. Barr and E. F. Du Bois, *Arch. Int. Med.*, May, 1918).—In afebrile conditions, the production of heat in the the body equals heat elimination, so that the body temperature is kept at a constant level. Obviously in fever either or both of these factors may become upset. Under normal conditions of health heat production is enormously increased during severe exercise or in such a physiologic response as the shivering after exposure to cold. But in such instances of increased metabolism no marked rise in temperature occurs, for the heat elimination is increased to compensate for it. From such considerations it would appear as if in fever there must be some disturbance in the power of the body to rid itself of heat. In calorimetric observations on the metabolism of typhoid patients, an increase in heat production was found to accompany a rising temperature in nearly all cases observed. The heat elimination was not equal to the heat production, but rose to meet the higher level of metabolism. In malarial paroxysms the increase in body temperature is due to an increasing heat production, which more than offsets a slightly increasing heat elimination. During a chill the heat production may increase from 100 to 200 per cent., falling immediately thereafter to within from 20 to 38 per cent. of the average basal level. At this time there follows a fall of temperature due to the greatly increased heat elimination. There is no indication of abnormal processes of metabolism in malarial fever except that the protein metabolism is somewhat increased.

Abstracts.

OIL OF CHENOPODIUM IN THE TREATMENT OF AMŒBIC DYSENTERY.[1]

By M. E. Barnes and E. C. Cort.

In connection with the campaign for the eradication and control of hookworm infection in Siam, dysentery was at the beginning considered as contra-indicating the administration of the anthelmintics used. As the improvement in the health of those taking the treatment became evident, however, persons suffering from dysentery as well as from various other conditions began to apply for examination. In spite of instructions to the contrary, a number of the dysentery patients were treated by the assistants and were clinically cured of their disease. Impressed by these favourable results, we decided to investigate the types of dysentery thus responding to treatment, one of us following cases in connection with the hookworm campaign, and the other cases treated at the Chiengmai Hospital. Attempts were made to follow the cases after treatment, and to secure specimens of stool for repeated examinations. This proved impossible in most instances, but in the cases reported in these pages, confirmatory examinations were made.

The patients in the cases reported were ambulant, but suffering from dysenteric stools, with the exceptions already noted. No cases of fulminating amœbiasis were treated by this method. When the microscope showed the presence of amœbæ, it was considered a safe criterion to diagnose as pathogenic those amœbæ that had ingested erythrocytes. No cases were diagnosed on the presence of cysts alone until those cysts had been activated by a saline cathartic, and the phagocytosis of erythrocytes observed in the amœbæ.

Method of Treatment.

The treatment to adults was administered in several ways. Some patients were given a preliminary dose of ½ oz. of magnesium sulphate, followed in two

[1] Abstracted from the *Journ. Amer. Med. Assoc.*, August 3, 1918.

hours by 1 c.c. of the oil of chenopodium in capsule. One hour later, a second dose of 1 c.c. of oil of chenopodium was administered, followed within an hour by 1½ oz. of castor oil. In more severe cases, the preliminary saline was omitted, and 2 c.c. of the oil of chenopodium were administered in 1½ oz. of castor oil at a single dose. In other cases the oil of chenopodium emulsified with gum acacia was administered by rectum. In such cases the anal mucosa must be protected with petrolatum, and it is well to terminate the injection with 2 oz. of an inert oil. The buttocks should be elevated, the enema given slowly and with great care, the first dose not exceeding 8 oz. in the adult. This enema should be retained for an hour, if possible. If the parts are well protected with petrolatum, the patient does not suffer from the intense burning sensations which would otherwise accompany the expulsion of the enema. In practically every case, after treatment by one of the foregoing methods, there was marked improvement in the condition, as blood and mucus disappeared from the stools on the second day after treatment. In a few cases, as will be noted in the case reports, this improvement was not evident or was only temporary.

After reading Walker and Emrich's article on the effect of oil of chenopodium on amœbic cysts, we administered the treatment to two patients in whom cysts were found, with the results indicated in the case reports. In one of these cases, chloroform was included in the treatment as recommended by Walker and Emrich, but on account of some unfavourable symptoms we have not used it in other cases.

Case 3.—A man, aged 24, had had from six to ten bloody stools daily for two months previous to consultation. Examination revealed active amœbæ, with ingested erythrocytes, and the ova of *Opisthorchis viverrini* Poirier. The patient was treated as in the foregoing. The next day the blood had disappeared from the stools, which became normal in number and appearance. Re-examination six days later revealed normal stools, no blood, no amœbæ and no cysts. Two weeks later, he stated that he was well and working. He has had one formed stool daily, since taking the treatment.

Case 4.—A woman, aged 54, for the previous twelve months had been having from four to six stools daily, with blood in practically every stool. Examination revealed amœbæ, with ingested erythrocytes, and ova of *O. viverrini*. The patient was treated as in the foregoing cases. The blood disappeared the next day. Seven days later, re-examination revealed a normal stool, with no amœbæ or cysts. She has had normal bowel movements since the treatment.

Case 5.—A man, aged 21, for the previous two weeks had been having from eight to ten stools daily with blood and mucus. Examination revealed active amœbæ, with ingested erythrocytes. Treatment was administered as in the foregoing, except that the second dose of chenopodium was given in the castor oil. All symptoms subsided within two days. Eighteen days later, examination revealed normal stools, no amœbæ and no cysts. The patient has been having one formed stool daily since the treatment and is working.

Twelve cases are reported, five with active amœbæ, six recurrent after emetine treatment, two of cyst carriers, and three cases failing to respond favourably.

Comment.

From these cases, as well as from others which could not be followed as carefully, it is evident that the oil of chenopodium possesses marked power as an amœbicide, and while some patients do not respond to it, many others are clinically cured by its administration. Cases complicated with a flagellate infection seem especially resistant to treatment. It is recognized that the absence of cysts from the stools is no proof that the patient has been permanently cured; but any drug that will cause such marked clinical improvement in dysentery patients as does the oil of chenopodium well merits further investigation. With emetine so difficult to obtain as it now is in oriental countries, oil of chenopodium may be used with great satisfaction in a large proportion of cases, emetine being reserved for the most severe types. For ambulant cases, oil of chenopodium is very convenient. It can be sent to a patient combined with castor oil, so that its administration requires no specially trained assistant, as would emetine, under the circumstances. So marked has been the improvement in the condition in the majority of the patients treated thus far, that as a routine measure all ambulant patients applying at the dispensary are treated as indicated, emetine being reserved for those patients who fail to respond promptly, or who show a tendency to relapse. A point to be remembered is that, on account of its irritating effects on the kidneys, oil of chenopodium should not be repeated in full doses at intervals of less than two or three weeks.

Conclusions.

(1) Oil of chenopodium relieves promptly the clinical symptoms in many patients with chronic and acute amœbic dysentery.

(2) Oil of chenopodium administered by mouth or by rectum possesses marked power as an amœbicide, as is shown by the rapid disappearance of amœbæ from the stools, following its administration.

(4) There is a tendency to relapse in some cases, but in our series this is not greater than with the use of emetine.

(4) The oil of chenopodium may be safely administered, when combined with castor oil in a single dose.

ERRATA.

In the article, "Some Observations on the Nature and Treatment of Malignant Malaria in East Africa," published in the Journal for August 15.

Page 166, column 1, line 31 from foot for *morning* read *evening*.

Page 168 column 1, line 11 from top the word *sterile* should appear as "*sterile*."

Original Communication.

NOTES ON MINOR CUTANEOUS AFFECTIONS SEEN IN THE ANGLO-EGYPTIAN SUDAN.

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CONTENTS. — *Introductory — Onychomycosis — Œdema of Eyelids—Streptococcal Ulcers—Cheilitis —Summary—References—Illustrations.*

Introductory.—We may be wrong, but we think that perhaps a few remarks with illustrations on some *Minor Cutaneous Affections* as seen here may be of interest to some of our fellow practitioners in the Tropics. The notes comprise affections of the nails, eyelids, feet or legs, and lips.

Onychomycosis.—The elder Mahon knew that favus could attack the nails, and this knowledge was published in 1820 by the younger Mahon.

In 1853 Baum and Meissner found a fungus of some nature in diseased nails, while in 1854 and 1856 Virchow figured a nail fungus which was something like *Trichophyton tonsurans*. He also expressed the opinion that several different kinds of fungi might attack the nails, and that one and the same nail might be the host of more than one variety.

After this Vidal in 1880 wrote the first monograph on the subject, and he was followed in 1888 by Pellizari, who gave an account of twenty cases.

From this date we may pass direct to the researches of Sabouraud, who grew *Trichophyton violaceum* Bodin 1902 and *Trichophyton sabouraudi* R. Blanchard 1895 from cases in Paris, where, however, the complaint seems to be rarer than in Bordeaux, where Dubreuilh, Arnozan, and others wrote about it.

In 1909 Colcott-Fox, in England, stated that he had met with the complaint in a boy and an attendant nurse. The boy suffered from an endothrix ringworm in the scalp.

Adamson, also in England, notes that while Microsporon does not attack the nails, he has found *T. tonsurans* Malmsten 1845 and also one of the pus-forming trichophytons of animal origin.

In 1913 Castellani stated that onychomycosis in the Tropics was generally due to the same fungi as those causing dhobie itch, both Epidermophytons and Trichophytons, as well as by those causing tinea imbricata, viz., the Endodermophytons.

In 1914 Foster published a well illustrated account of the disease as seen in aliens entering New York. Out of 521,366 aliens he found 101 cases, of which eighty-four were ringworms and seventeen favus.

Our case occurred in a European in whom it had lasted apparently for several years, and was probably not acquired in the Sudan, though only noticed therein.

Only the nails (fig. 1) of the big and the third toe of the right foot were considerably affected, although the nail of the hallux of the left foot had been similarly affected, but showed much less of the disease than the right at the time of examination, as it had been treated very vigorously.

It will be noted that with regard to the third toe the growth was quite superficial, but with regard to the hallux it was quite otherwise.

Along the inner margin of the nail from its free border to its insertion into the skin there ran a yellowish, white, soft, crumbly mass which extended outwards under and into the nail substance, and had so far affected the nail that a transverse crack (fig. 1) through the nail substance had occurred.

The rest of the nail appeared to be normal. The skin surrounding the toe and also that of the foot was quite normal. The nail of the left hallux had been in a similar condition, but here the skin on the dorsum of the toe was red and inflamed, although no fungus could be found.

A quantity of the yellowish-white crumbly material was removed and soaked for ten hours in 40 per cent. caustic potash at 37° C. in an incubator.

On examining this preparation microscopically a number of broad hyphæ (fig. 2), measuring some 3·3 microns in breadth, were observed.

These hyphæ can be seen (fig. 2) to have a double contour, and the segments thereof to be somewhat rectangular. We only observed a few spores.

When stained by the Oxford method (fig. 3) the mycelium showed how old and degenerate it was.

Sections were cut of the yellowish white material, but there was nothing of value to be learned from them.

Cultures were prepared on several distinct occasions on all the usual fungal media and many extraordinary media, and incubated aerobically and anaerobically at various temperatures, but we never obtained the least sign of a growth, nor indeed did we expect so to do, considering that the infection had probably lasted for years and had certainly diminished remarkably in the left hallux under treatment.

We were, therefore, compelled to fall back upon the older method of diagnosis, viz., the occurrence of a fungal disease in some other part of the body.

The patient gave a clear history of an attack of Tinea cruris some years ago, and stated that he had noticed the affection of the nails some time after this had been cured.

The microscopical appearance of the fungus and the breadth of the hyphæ agree with Castellani's account of his *Epidermophyton cruris*, and therefore we conclude that some species of Epidermophyton was the probable causal agent.

With regard to the diagnosis of an onychomycosis, the principal features of the disease are:—

(1) The yellowish-white, thickened, crumbly condition of the nail.

(2) Generally a few and not all the nails affected.

(3) The presence or history of a cutaneous fungal infection of some other part of the body.

(4) The discovery of the fungus in the affected nails.

With regard to the differential diagnosis, this has to be made from syphilitic dry onychia, psoriasis, eczema, alopecia, pemphigus, Epidermolysis bullosa, Pityriasis rubra, Lichen planus, Darier's disease, congenital malformations, and disturbance of the nutrition of the nails due to accidents.

In the present case *syphilitic dry onychia* was excluded by there being no history or sign of syphilis, by the absence of the peculiar friability of the free border of the nail, by the absence of linear postero-anterior rows of pits on the nail, and by the presence of the fungus.

Psoriasis of the nails was excluded because there was no history that the patient had ever suffered from the disease, and there was no sign of the complaint on other parts of the body, nor were there any punctate pits on the nails, nor opaque scaly patches beneath the free end of the nail, nor was the whole nail opaque, thickened, and ridged, and by the finding of the causal fungus.

The so-called *eczema* of the nails was excluded because, although there was some dry eczema on the fingers, there was none on the toes or feet, while the nails of the hands were unaffected, and those of the feet were infected with a fungus.

Alopecia was excluded because it did not exist in our patient, neither did *Pemphigus, Pityriasis rubra, Lichen planus, Darier's disease, or Epidermolysis bullosa.*

With regard to the *Simple Atrophy* or *Simple Hypertrophy* of the nails of congenital origin, these were excluded by the history of the case and by the fact that all the nails were not affected.

Accidents such as burns, causing malnutrition of the nails, were excluded by the history and by the lack of clinical evidence of any burns on the feet.

With regard to treatment, we first cut away with the scissors and forceps as much of the affected tissue as we could, and then with a small Volkmann's spoon scraped away until we could find no more of diseased tissue.

Immediately on finishing this we applied to the scraped areas a small strip of lint soaked in a lotion composed of a 6 per cent. solution of iodide of potassium in equal parts of liquor potassæ (B.P.) and distilled water. We covered this piece of lint with oil-silk so that it extended well beyond the margins of the lint. We kept this in position for fifteen minutes, and the toe became quite painful during the last five minutes.

We then applied another piece of lint soaked in a lotion of 1 per cent. perchloride of mercury in equal parts of rectified spirit and water and covered it up with oil-silk, and kept it in position by means of a bandage. This was not painful, but next morning the skin of the toe in the neighbourhood of the nail was very inflamed and painful. In about two days this inflammation went down under the application of a very mild carbolic glycerine and alcohol lotion, and since then we have been unable to find any fungus, and the nail has grown normally.

Perhaps it will recur, but perhaps because of its age we were able easily to kill the fungus, and because we appeared to be successful in the other toes by merely scraping and applying the perchloride of mercury lotion.

Œdema of the Eyelids.—In Khartoum Europeans and natives alike are liable to awake from an ordinary night's rest to find that their eyelids are swollen more or less in the manner depicted in figs. 4 and 5. On these swellings can often be seen, sometimes very clearly, the marks of a bite as indicated by one or two little red areas which, when double, are close together, and look as though caused by a minute pinch with something sharp.

The swelling naturally causes some little alarm, but it subsides after treatment with fomentations of warm boracic lotion.

We have attempted to discover the cause of these swellings, and we regret to say that we are by no means certain as to the cause.

They cannot be due to mosquitoes, as the mosquito bite is different and as mosquitoes at the time that these photographs were taken were extremely rare in Khartoum, and none had been seen in the house or neighbourhood.

Sand-flies bite generally on the arms, feet, and legs, and produce quite different effects.

They might in some cases be due to bed bugs, but the bite of these insects is different, and they were excluded in fig. 4 because there was no evidence of their bites on other parts of the body, and the bed and bedroom were searched without discovering any bugs; but, on the contrary, numbers of very small ants were found in the house, on the bed, and even on the pillow.

Further, at another time a person staying in the same house woke up one morning with an irritation of the eyelid, which was followed by a severe pain in the eye. On examination it was found that a very small ant had fixed itself by its jaws to the sclerotic coat of the eye. This very small ant was with difficulty removed, and the bite was followed by a mild attack of conjunctivitis, but no swelling of the lid.

This case makes it possible that the ants are attracted to eyelids to suck some of the secretions therefrom, and that they do not intend harm, as the person in question remembers rubbing the eyelids before the sharp pain occurred and may have turned the ant under the eyelid.

Moreover, we have also seen a case in which the bite was on the margin of the lower lid and the œdema was much less marked than usual, and this confirms us in our opinion that some insect like an ant comes to suck the eyelid juices.

The ant obtained from the sclerotic coat of the eye, as mentioned above, was kindly sent for us by Mr. King, the Government Entomologist, to the British Museum, where it was recognized as being a species of the genus *Monomorium* Mayr 1855, of

which the type is *M. minutum* Mayr 1855. *M. pharaonis* Linnaeus 1758 is known in England, having been introduced from Egypt.

The species in question, however, is *M. bicolor subspecies nitidirentre*, but the authorities of the British Museum cast doubts on its being the causal agent. On the other hand, the laboratory head attendant, when asked what caused these swellings, at once went and brought an ant in a test tube. He says its Sudanese name is "Darra." Syrian residents also believe the swellings to be due to ant bites, and these opinions cannot be lightly ignored.

In Ceylon it is well known that a very small ant which infests beds can bite people when asleep, producing urticarial lesions; unfortunately, we do not know the genus or species of this ant.

The ant we rather suspect as the cause of the œdema of the eyelids here is also very small (fig. 5 (*a*) which is magnified), but we are not in the position to say whether it is the same kind of ant, although we know that, according to Donisthorpe, the genus *Monomorium* comprises a number of species which are distributed all through the Tropics.

We know that the swellings are due to a bite as one can see the mark, which indeed is visible in fig. 5, but we have not been able to settle the causation of these swellings of the eyelids, and are compelled to leave this to other investigators, but we do know that powdered camphor spread in the beds will keep the ants away, and that in the house in question no ants on the beds seemed to be associated with no swellings of the eyelids.

Streptococcal Ulcers.—Fig. 6 depicts a form of ulceration of the foot and leg which is not uncommon in the Sudan. The history of this particular case is rather interesting. The patient is one of the senior boys of the Gordon College, who scratched his foot while playing on one of the College fields. The slight abrasions were duly disinfected with a lotion of permanganate of potash, which is always kept ready for this purpose.

Notwithstanding this disinfection, the two ulcers slowly formed and slowly deepened and spread.

It will be noted that the two small ulcers have markedly undermined edges, and that the surface is composed of white, glistening, connective tissue-looking material. The base, which was deep in the corium, was not indurated or attached to the bone. There was no enlargement of the lymphatic glands. These ulcers had been in existence about a couple of weeks and had been very thoroughly treated, and though they caused no pain, still they showed no sign of healing.

It appeared to us that the essential feature in the treatment was to discover the cause. If fig. 6 is examined it will be noted that there is a small piece of tissue visible in the depth of the right-hand ulcer. This material we removed, and crushing it between a slide and coverslip we found, on microscopical examination, that it consisted of white fibrous connective tissue, between the fibres of which lay the numerous long chains of a streptococcus.

We then prepared cultures in Holman's medium by the technique which we have so often described in this journal, and we obtained, in pure culture, a streptococcus whose characters may be summarized as follows:—

Morphological Characters.—The streptococcus forms long chains which are Gram-positive and are not encapsulated or motile.

Biological Characters.—This streptococcus grew well at 37° C. under both aerobic and anaerobic conditions. It gave rise to the typical streptococcal colonies on agar, and it produced no pigment on that medium or on inspissated ox-blood serum. It failed to liquefy gelatine after one month's incubation at 22° C., though it grew fairly well at this temperature.

Biochemical Reactions.—The streptococcus grew well in the following media, producing acidity, but no gas:—

Monosaccharide: Glucose.
Disaccharides: Lactose and Saccharose.
Trisaccharide: Raffinose.
Glucoside: Salicin.
Alcohol: Mannitol.

These are the only carbohydrate-alcohol media which we now use for the differentiation of streptococci, as such readers as remember our other papers in this journal will know.

The quantitative estimation of this acidity in terms of cubic centimetres of $\frac{N}{20}$ caustic potash solution is as follows:—

Glucose ...	0·7
Lactose ...	1·0
Saccharose	1·9
Raffinose	1·4
Salicin ...	1·2
Mannitol	1·2

The streptococcus also produced acid and clot in *Milk*, but it did not reduce *Neutral Red* when grown therein under anaerobic conditions, nor did it give rise to any *Sulphuretted Hydrogen*. It was, however, markedly *hæmolytic*, as tested by North's method.

From the above characters we judge that the organism in question is *Streptococcus versatilis* Broadhurst 1915, being the hæmolytic variant so well known in the Sudan.

We feel that it is quite unnecessary to repeat the table by which this diagnosis of the species or variety of this streptococcus is determined, as we have repeatedly given them, and Chalmers and Archibald have recently reproduced them in their paper on *Streptococcal Dematitis*.

As this particular streptococcus is known to be common in equine fæces in the Sudan the source of the infection is obvious, as donkeys graze on the playing fields.

The diagnosis of streptococcal ulceration was therefore made, and other boys were found to be suffering from the same condition.

The treatment was simple. Streptococcal vaccines were given at few days' intervals in doses of ten, fifty, and one hundred millions, while the

ulcers were first dressed with carbolic lotion, then with red lotion, and finally with zinc oxide ointment. As the boy was not at all ill he desired to attend his classes and to walk about, which prolonged the time of the cure, which, however, was quite satisfactory.

Cheilitis.—Crusts with or without slight fissures of the lower lip are to be seen at times in the Sudan. Fig. 7 shows an exceedingly mild case, and we regret that we have been unable to obtain photographs of more severe cases. This mild eruption does not, as a rule, extend into the mucous membrane of the mouth or outwards on to the skin of the lips, and is merely limited to the dark red area of the lips. When the crusts separate the affected part is much brighter than normal. The condition may last for years, e.g., the condition in fig. 7 had been going on for nine years, and the patients only complain about it because of the disfigurement, i.e., the small boy and the old man do not bother about it.

As there has always been a slight tendency to seborrhœa in the cases we have seen, we judge that this is the condition to which Stelwagon invited particular attention under the name *Dermatitis seborrhoica-Cheilitis exfoliativa*, which disease has been noted, as far as we know, only once before in the Tropics., viz., by Castellani in a European lady in Ceylon.

In the slight case illustrated in fig. 7 we used merely a mild ointment, but in any case it is better to remember Stelwagon's dictum to treat the lips cautiously at first, and only to resort to strong remedies like resorcin, silver nitrate, &c., when these have failed. Personally, we prefer a mild salicylic acid, spirit and water lotion, followed by a cold cream.

Summary.—In the above notes we draw attention to a case of *Onychomycosis* possibly due to some species of the genus Epidermophyton.

We also invite attention to the common *acute œdema of the eyelids* met with in Khartoum which is due to a bite of some animal, possibly an ant.

We refer to *streptococcal ulcers* caused by *S. versatilis* Broadhurst 1915, which is commonly met with in equine fæces, and we note the presence of *Cheilitis* in the Sudan.

For all these conditions we endeavour to indicate a line of treatment.

Khartoum,
May 2, 1918.

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(*b*) Œdema of the Eyelids,

Castellani and Chalmers (1913). "Manual of Tropical Medicine," 2nd edition, p. 197. London.

(*c*) Streptococcal Ulcers.

See the rather numerous Notes published in this Journal on "Streptococcal Infections of the Sudan."

For remarks on "Ulcers in the Tropics" see Castellani and Chalmers' "Manual of Tropical Medicine," 2nd edition, p. 1569.

(*d*) Cheilitis.

Castellani and Chalmers (1913). "Manual of Tropical Medicine," 2nd edition, p. 1641. London.

Stelwagon (1916). "Diseases of the Skin," pp. 344, 345, and figs. 77 and 78. Philadelphia.

ILLUSTRATIONS.

Fig. 1.—Photograph of toe-nails showing *Onychomycosis.*

Fig. 2.—Fresh preparations of a portion of the yellowish-white crumbly material from the hallux shown in fig. 1. (Note the fungal hyphæ). × 900 diameters. Photomicrograph.

Fig. 3.—Fungus from fig. 1 stained by the Oxford method. × 700 diameters. Photomicrograph.

Fig. 4.—Œdematous swelling of the inner canthus. Photograph.

Fig. 5.—Œdematous swelling of the upper eyelid. (Note the mark of the bite). Photograph.

Fig. 5*a*—Suspected ant. × 12 diameters. Photomicrograph.

Fig. 6.—Streptococcal Ulcers. Photograph.

Fig. 7.—A very mild case of *Cheilitis.* Photograph.

Mucous Enterocolitis (P. Finizia, *Gazetta degli Ospdali e delle Cliniche*, April 14, 1918).—This is a dysenteriform set of symptoms common among the troops on active service, but it never lasts very long, and does not impair the general health. Treatment should be restricted to resting the bowels; any attempt to give a purge is liable to aggravate and prolong the symptoms. Sudden pain is usually the first symptom, and the recurring colic and desires for frequent defecation are not accompanied by diarrhœa. The act of empty defecation is painful and difficult; often nothing is voided but mucus and blood. The most effectual treatment is oil to reduce the inflammatory condition in the bowel, giving a little opium in the oil to reduce the reflex irritability, with food that makes little demand on the intestines.

Treatment of Malaria (D. Granelli, *Policlinico*, June 16).—It is popularly said that malaria in a soldier never gets cured. Unfortunately, this often is true. The lack of systematic quinine treatment is the reason for this, as the malarial soldier passes through so many hands. Special malaria sanatoriums should be established in elevated positions not far behind the Front, where the men could be given thorough treatment without delay, before the parasites get too firm a foothold and grow drug-fast. This would also prevent infection of the home regions by the malarial soldiers returning from the hotbeds of malaria in Macedonia and elsewhere.

Fig. 1.

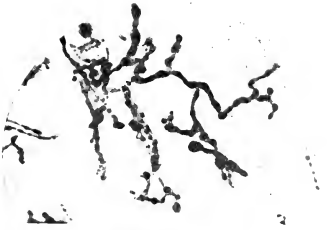

Fig. 3.

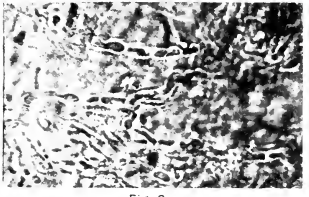

Fig. 2.

Fig. 4.

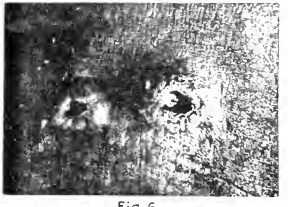

Fig. 6.

Fig. 5(a).

Fig. 5.

Fig. 7.

To illustrate paper, "Notes on Minor Cutaneous Affections seen in the Anglo-Egyptian Sudan," by ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H., and ALEXANDER MARSHALL.

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THE JOURNAL OF

Tropical Medicine and Hygiene

October 1, 1918.

FIRST-AID IN TROPICAL WORK.

In our issue of August 15, in a leader devoted to Dr. Sambon's virile paper which appeared in "West Africa," we pointed out what we considered to be the bounden duty of Imperial and Local Governments with regard to the prevention of disease in Africa, and West Africa more especially. But there is another side to the question in which the individual has to play a part. The subject may be divided into three headings:

I. The Men and Women proceeding from the Homeland in Europe to Tropical and Semi-tropical Countries.

In the Homeland the diseases are well known by our parents and grandparents. Their signs and symptoms are for the most part readily recognized, and to a certain extent their management is understood. But young men and women when they go to the Tropics are launched into an atmosphere of fresh dangers and exposed to ailments with which they are wholly unacquainted. Many of the ailments of their native land disappear in tropical countries, markedly rheumatic fever, scarlet fever, and several of the lung and heart affections, but instead these are supplanted by the ubiquitous malaria, various forms of dysenteries, plague, cholera, and a host of skin affections. With the latter there is no parental guidance to be had, no race acquaintance to guide and warn the young people in their fresh environment. It is unwise, to say the least of it, both in the interests of the business firms and of the individual, to be thus plunged unprotected into a world of ever-present possible infection.

Not only is it unwise, but it approaches the fringe of cruelty to the young man or woman that such a condition should obtain. Young and valuable lives are lost through the want of parental guidance, race memories, and want of instruction of how to deal with the dangers that threaten.

Another group to whom instruction of this kind is necessary is to the nurses, whether professional or members of Voluntary Aid Detachments and others, who during war have been placed in charge of patients suffering from ailments peculiar to warm climates.

At the present moment, at the several Fronts, such as Mesopotamia, Palestine, Greece, and Italy, whither our nurses have been called upon to serve and to take charge of persons suffering from diseases which are new to them, it is no wonder that they become bewildered in their methods of procedure with regard to nursing. For instance, there is the danger of regarding every rise in temperature as due to malaria, forgetting that there are a legion of other causes due to local diseases, as well as of the type commonly met with at home.

II. The Health of the Nurses and Orderlies.

It is necessary to see that these are protected by every means which modern science can devise. Not only is prophylaxis by means of vaccinations and inoculations against typhoids, small-pox, &c., to be attained, but as important, if not more so, are the hygienic steps to be followed in the environment in which their duties lie. The necessity for mosquito nets around their beds, and the still more important method of screening the doors and

windows of the house itself, must be insisted upon imperatively, and not left to the haphazard methods which at present prevail in even official quarters. Seeing also that they are constantly in contact in the hospitals with sufferers from ailments which are new to them, instruction in tropical ailments is a vital part of their training before being allowed to leave the home shores, both for the sake of the patients under their care and in their own interests.

III. The Necessity for Instruction in Tropical Ailments for those Attending our Soldiers in Military Hospitals in Britain.

Scattered throughout the British Isles, north, south, east, and west, are to be found men suffering from ailments contracted in warm climates. If these soldiers' welfare is to be properly dealt with, it is absolutely necessary that the nurses and orderlies in our hospitals should be fully instructed as to the nature of these diseases. In even remote districts such cases are to be met with, so that there is no hospital in this country at the present moment where such knowledge is not required.

Even in times of peace the question of a knowledge of tropical diseases for nurses is of vital consequence. The numbers of men, women, and children going and coming between the British Isles and the Tropics amounts annually to tens of thousands. As these come to any and every district of the Mother Country, the village nurse is as likely to meet with these ailments as is the nurse in towns and cities.

To meet this present and growing branch of medicine and surgery it is necessary to have a training centre or centres, where not only the nurses but the public have the opportunity of studying this most important and requisite department of public health. It is but applying what is already done by the ambulance societies in the case of first-aid to the injured, home nursing, home hygiene, &c.

With this object in view, we are informed that it is proposed to hold classes of instruction under the heading of First-aid in Tropical Ailments and in Tropical Ambulance at the College of Ambulance, 3, Vere Street, Oxford Street, London, W.1. Several of the staff of the London School of Tropical Medicine have agreed to take up this work, so that the instruction to be given shall be conducted by the foremost experts in the Empire.

We are quite aware of the great work that the College of Ambulance has accomplished for the last four years in civil and military branches of ambulance work, including that of hygiene. But we feel confident that in no department of the great work being carried on at the College will a more important benefit be bestowed upon the welfare of the Empire, both at home and abroad, than by this new branch of "first-aid" which is about to be taken up and developed.

J. C.

Abstract.

CŒLIAC DISEASE.[1]

By G. F. Still.

The condition is not one of those specially incidental to poverty or to lack of hygienic surroundings, it is not a mere variation or outcome of the ordinary diarrhœa of infancy.

The age at onset is, in the majority of cases, the later part of infancy, between the age of 9 months and 2 years. The earliest in my series was 8 months, the latest 4¼ years. Only two other cases began as late as 3 to 4 years of age.

The clinical picture, when it has already lasted for two or three years, is sufficiently striking.

The child is pale and emaciated, although the face sometimes remains full and apparently plump even at a late stage of the disease. The large abdomen contrasts with the wasted limbs, and the general appearance is that of tuberculous peritonitis, for which cœliac disease is apt to be mistaken. The most striking feature is the surprising inconsistency of the child's size with its age. What appears to be an infant little more than 12 months old startles one by unexpectedly talking, and so reveals the fact that it is at least a year or two older, perhaps three or four years older, than its appearance would suggest.

On inquiry it is found that the child's stools, though not more than one or two a day, have almost never been formed since the illness began, and that they are generally pale or the colour of oatmeal. At intervals of a few weeks the stools become more loose and frequent, perhaps three or four a day instead of one or two. These recurrent bouts of increased looseness are very characteristic of the disease.

The weight, moreover, though it fluctuates, has made no permanent advance for many months, or even for a year or two; and the net outcome of its variations may even have been a loss of 2 or 3 oz. in as many years.

So the disease drags on for months and years.

Wasted and feeble, the child passes an invalid existence with intervals of improvement followed by a relapse, until, as a result of rigorous dieting, the stools gradually became more normal, and the child eventually struggles back to health, able to take food more or less like other people, but handicapped in growth by the lost time during which the development has been arrested. Even such a favourable result, however, is not to be expected in all cases, for the relapses with increased looseness of the bowels are exhausting, and may end fatally.

Symptoms.

Diarrhœa.—The early history of these cases is obviously of importance in determining the pathology of the disease.

[1] Abstracted from the *Lancet*, August 10, 17, and 24, 1918.

In a considerable proportion, eight out of twenty of those in which the onset was more or less defined, there was a history of an attack of diarrhœa, with or without sickness at the onset, and since then the stools had never been normal except occasionally, perhaps, for a day or two.

Prima facie this sequence would suggest that the initial diarrhœa and the subsequent looseness of the bowels and recurrent exacerbations of looseness were due to an infection which had never been entirely thrown off by the bowel, and it might even be conjectured that any diarrhœa of infective origin might lead to such a disorder.

Diarrhœa is not a necessary antecedent. In three out of those twenty cases the mother declared that the bowels had "always been loose"; there was no particular attack of diarrhœa. In four out of the twenty the onset had been entirely insidious, with wasting, and in one at least of these there had been constipation at first, with wasting, until after weeks or months the bulky and pale character of the stools and their looseness became pronounced.

Infantile Scurvy.—A curious fact which appears in my series of cases is the occurrence of "infantile scurvy" as the antecedent of "cœliac disease" in a proportion of the cases, too large to be entirely accidental; four out of forty-one cases had "infantile scurvy" just before or during the onset of "cœliac disease."

These children fall victims to scurvy as a result of the diet used for the treatment of the disease. It may be that infantile scurvy conduces in some way to diarrhœal affections; certainly experience teaches caution in its treatment on account of this particular tendency. Quite apart from the fact that the passing of blood from the bowel in scurvy shows that the mucosa is in some way affected, there are clinical phenomena which suggest very strongly that the deficiency of vitamines which produces scurvy produces also a lowered resistance to infection. It may be that in this way the food factors which lead to scurvy predispose also to cœliac disease.

Stools.—Quite early in cœliac disease the stools show characteristic qualities:—

They are bulky, pale, creamy, pultaceous, resembling more or less closely well-boiled porridge, except that they look more glistening and greasy than porridge does; the smell, too, is very offensive, fatty and sour, perhaps rancid best describes it; the reaction is markedly acid, and the stool floats in water.

But while such is the typical stool, there is much variation from time to time; sometimes for a few days the stools are pale yellow, or even brown; sometimes they are white and shreddy; occasionally the child will pass a formed stool, differing little from the normal except in its pale drab or fawn colour.

The character of the stool tends to change as the disease becomes of longer standing.

The white porridgy stools which were usual during the first year or two of the illness become less and less a constant feature until the evacuations quite as often consist of shreddy or soft fæcal material, pale grey or greenish or even dark brown, mixed with mucus, which in rare instances may even show a trace of bright red blood. In one advanced case pus was found in the stool during one of the bouts of looseness. Occult blood has been found occasionally even in the earlier stage of pale porridge-like stools.

In some cases the parents themselves have particularly noticed the change in the character of the stools after the disease has lasted some years. It suggests that lesions found at that stage may be of secondary origin; inflammatory and perhaps ulcerative changes in the lower part of the bowel may be secondary to unhealthy conditions in the upper part.

With the unhealthy condition of the stools there is associated distension of the abdomen, which forms one of the characteristic features of the disease. In cases that do badly this sometimes becomes so extreme as to cause considerable distress to the child before the fatal termination; in cases that do well it is one of the last symptoms to disappear.

The *absence of vomiting* in most cases, except as an uncommon incident, seems to indicate that the condition is rather an intestinal than a gastric disorder.

Pain there is usually none, or fever, and when it has been present has been only a slight transient discomfort such as might be produced by flatulence. To this statement exception must be made of the severe pain which has occurred a day or two before death; this was noted by Drs. Poynton, Armstrong, and Nabarro in their fully recorded fatal case, and autopsy showed no explanation of the pain. It occurred also in a girl under my observation, but no autopsy was made, so its cause was uncertain.

Urine.—The urine I have examined in many cases without finding anything abnormal.

Indican is not a constant feature.

Liver is not enlarged.

The *spleen* also is usually not to be felt, a fact which may be of importance if the possibility of congenital syphilis is in question.

Blood Changes.—The pallor, which is always a more or less marked feature of the disease, is found to be associated chiefly with a deficiency of hæmoglobin in the blood, but not of any profound degree.

The *arrest of derangement* is one of the most striking features of the disease, and this is not merely a cessation of gain in weight, but also a cessation of growth, a point which distinguishes it from the atrophic conditions which result from various disorders of digestion in early life.

A noticeable feature, which no doubt is to be explained as part of the arrest of growth, is the smallness of the voice in most of these cases.

It tends to high pitch and very limited compass, characters due probably to the smallness of the larynx. This feature, however, is in curious contrast with the rather gruff voice which obtains in some other conditions where growth is delayed—for instance, mongolism and cretinism.

Even when recovery tends to be complete, a peculiar weakness of the legs is left long after all other tokens of disease have passed away, a weakness which shows itself in that the child is unable to jump.

The *mental capacity* does not seem to be affected.

Complications.—In the course of the illness various complications are apt to arise. One of the most frequent—so frequent, indeed, as almost to be a symptom of the disease—is *œdema* more or less general, though seldom of more than moderate degree.

It is most notable usually in the hands and legs and feet, but the face also has a puffy appearance, especially about the lower eyelids. As part of this dropsy there is sometimes a definite ascites, and this may be more obvious than the slight general œdema. In one case under my observation it had led to a diagnosis of tubercular peritontis of the ascitic form, for which laparotomy was to have been performed on the day following that on which I saw the child.

Purpura occurred in several cases.

In some it occurred as part of the terminal condition when emaciation had become extreme and such a development might be expected, but in others patches of purpura appeared when the child was rather improving than otherwise, and was well enough to be up and about.

In one girl, for instance, purpura appeared many times from the age of 2½ until the child died of the cœliac disease at the age of 9½ years.

In another patches of purpura were still occurring when the boy had improved so much that he was gaining weight rapidly and had already become fat; a clear proof that the purpura is quite independent of emaciation.

A complication due rather to the treatment than to the disease was *scurvy*, which occurred in five cases between the ages of 3 and 7 years. In two of these there had been scurvy also preceding the onset of the disease.

In one case only, the case in which the disease was still present at 17½ years, there was a *chronic glossitis*.

The tongue was completely bald, almost glazed, with deep fissured ulcers at its margin; it was so sore that at times the girl was unable to eat solids, and the soreness and ulceration had been present in greater or less degree for some years. The only affections of the tongue which I have noted in other cases were in two a tendency to ordinary aphthous ulcers, and in one annulus migrans.

Similarity to Sprue.

Both are characterized by looseness of the bowels, which persists usually for years; in both there are recurring exacerbations of the looseness; in both the stools are bulky, pale, whitish, usually acid, peculiarly offensive, and on analysis show excess of fat.

In sprue the small size of the liver has been specially noted.

The remarkable sex incidence of cœliac disease may be another point of resemblance.

Some observers state that sprue has no special sex incidence, but Jefferys and Maxwell, in their "Diseases of China," (1910), say "the female sex is far more predisposed to this disease than the male sex."

One noteworthy case in this connection was a child born in India, where at the age of 9 months she began to suffer with cœliac disease, which she still had at the age of 5¾ years. The child was a most typical case of cœliac disease; the mother was at the same time ill with sprue, also acquired in India, and was under treatment by some of the authorities for tropical disease.

Clearly the identity of these disorders cannot be affirmed until a specific cause common to both has been established, but in the meantime the clinical resemblance is sufficiently striking to justify raising the question.

Prognosis.

The course of cœliac disease is always slow and tedious, a year or two at least. It is impossible to assign any exact date of recovery, for it is only very gradually that the ability to digest ordinary food is restored, and therewith the stools resume a normal character, and even then there remains for a long while the stunted growth.

As happens with most diseases which last for years, these cases tend to pass out of the care of one medical man to that of another, so that it is difficult to keep track of them, but such records as I have been able to obtain are sufficient to show how protracted this disease may be.

One girl, in whom the symptoms dated from about 9 months, weighed 21 lb. at 5¾ years, and was only improving at the age of 6¼, and died at about 9 years of age.

Another, in whom cœliac disease began at about 20 months old, was seen by me at intervals with relapses following temporary improvement until she died with an exacerbation of looseness and with distension of the abdomen at the age of 9½ years.

Another, a boy, who had been under treatment for cœliac disease from about 12 months of age, died when 8 years old.

Sometimes a fatal result comes earlier; a girl in whom the symptoms appeared at 21 months died of cœliac disease at 4 years.

Another girl in whom the disease began just under a year old died at the age of 21 months, but in this instance the termination was due apparently less to the disease than to an accidental complication, bronchopneumonia; and in another, a girl who had been under treatment for cœliac disease since the age of 14 months, a fatal ending at 2¾ years was due to a streptococcal pharyngitis which could only be regarded as an accidental occurrence.

It is a disorder that does not lead rapidly to a fatal ending. On the other hand, the proportion of cases in which complete recovery can be affirmed is not large.

(To be continued.)

Original Communications.

FREQUENCY OF LACTOSE FERMENTERS IN SIERRA LEONE WATERS.

By W. A. Young, M.B., Ch.B.St.And., D.T.M.Livp.
Medical Officer in charge Lab., Col. Hosp., Freetown.

While analysing water samples taken from Freetown-Bonthe and the Protectorate of Sierra Leone during the last twelve months, I have been struck by the frequency with which lactose fermenters have been found in the samples, at least 50 per cent. having this feature being found both in wells and in the rivers. This necessitates going into detail each time. The lactose medium is fermented to determine if the exciting organism is *Bacillus coli*. In thirty samples typical *B. coli* has only been found once.

Two organisms have been found which cause this fermentation, one a short bacillus 2 to 3 microns long, the other the same length, but stouter, and having a central spore, but the spore may sometimes be situated nearer one end. The spore-bearing organism is the commoner one found. These bacteria were found in the following way: The sample was mixed with sterile peptone broth and incubated at 37° C. They are, therefore, aerobic. No indol was formed even after a week. Suspended drops showed total lack of motility. They were negative to Gram's stain.

In tubes of MacConkey's bile salt broth both acid and gas were formed.

From these tubes Conradi Drigalski plates were smeared and two colonies were grown, one, the spore-bearing organism, turning the medium a brighter red than the other. Subcultures of the two growths on to agar produced vigorous growths—still alive after five days. The colonies were opaquely white in the centre—thinning to the margins, which were transparent—circular, and edges even.

The sugar and other reactions are as follows (dulcite was not to be had):—

	Spore-bearing bacillus	Non-spore bearing
Lactose ...	A and G	A and G
Glucose ...	A and G	A and G
Mannite ...	A and G	A and G
Galactose ...	A and G	A and G
Maltose ...	A and G	A and G
Saccharose ...	A and G	A and G
Lævulose ...	A and G	A and G
Glycerine ...	Very slight acid ...	—
Neutral red...	Negative	Negative
Milk ...	Acid—no clot even after 3 days ...	Acid—no clot after 3 days
Indol ...	Negative	Negative
Motility ...	Negative	Negative
Peptone broth	General turbidity ...	General turbidity
Gram ...	Negative	Negative

A living culture of ten millions per c.c. was injected into rats, but beyond a slight initial effect proved non-pathogenic, the rats being alive and well two months afterwards. From the above it would appear that these two organisms were varieties of the same.

My purpose in recording this is to warn against too hastily condemning a water because it ferments lactose media.

The following chemical analysis shows that these bacteria may be found in very pure waters.

Freetown Water Supply.—Taken January, 1918.

Saline ammonia	=	0·00375	pts. per	100,000
Albuminoid	=	0·0072	,, ,,	,,
Chlorine	=	0·800	,, ,,	,,
Nitrites		*Nil*		
O_2 absorbed in 2 hours at 37°C.	=	0·04	,, ,,	,,

THE SUSCEPTIBILITY OF THE ANTI-SCORBUTIC PRINCIPLE TO ALKALINITY.[1]

By Professor A. Harden, D.Sc., F.R.S.

Guinea-pigs, if kept on a diet of oats, bran, and auto-claved milk, succumb to scurvy within a period of three to four weeks. Any anti-scorbutically active substance given in addition to this scorbutic diet will either delay or prevent the onset of scurvy, according to the potency of the dose. It is found that a daily addendum of 3 to 5 c.c. of freshly expressed orange juice keeps a guinea-pig in good condition.

Daily doses of 3, 5, and 7 c.c. of orange juice made neutral to phenolphthalein were administered respectively to three guinea-pigs, which were kept on a scorbutic diet. All these animals throve well for seventy-eight days, gaining in weight. At the end of that period they were chloroformed, and at the post-mortem examination no scurvy was observed. When, however, the orange juice was made N/20 alkaline with NaOH and stored for twenty-four hours in the cold room before administration, daily doses of 3, 5, and 7 c.c. did not prevent or delay the onset of scurvy. This result is not due to the effect of the alkali on the animals, for when the N/20 alkaline orange juice, after having been stored for twenty-four hours, was made N/20 acid with HCl before being given to the animals the effect still persisted. In this instance, as in the previous experiment, daily doses of 3, 5, and 7 c.c. did not prevent or delay the onset of scurvy.

A much less drastic treatment was also found to be fatal to the anti-scorbutic factor. Another set of three pigs received daily 3, 5, and 7 c.c. of orange juice made only N/50 alkaline with NaOH on the day of feeding. All the animals died of scurvy after a slightly prolonged period, thus showing that the juice, after being made alkaline, retained only a trace of its anti-scorbutic activity.

These experiments show definitely that alkalinity has a very deleterious effect on the antiscorbutic potency of orange juice.

[1] Abstracted from the *Lancet*, September 7, 1918.

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THE JOURNAL OF

Tropical Medicine and Hygiene

OCTOBER 15, 1918.

SCIENCE IN ITS INTERNATIONAL RELATIONS.

IT is usually said that science recognizes no nationality, is not limited by national boundaries, and the term "friend and foe" enters not into her vocabulary. It is a comforting thought that this universality prevails, that mankind should have a common ground of thought, a basis on which Burns's immortal prophecy, "That man to man this world o'er, shall brothers be for a' that," may be fostered and fulfilled. Language is by some said to be the means of uniting people, and a universal language is hopefully spoken of from time to time as the only channel to bring about so great a consummation. Has either of these hopes as yet been fulfilled? It cannot be said to be the case.

Language certainly has not, neither has science, nor religion, succeeded in bringing so fond a hope to fructification. Recently some British scientific societies have been discussing the point how German scientists are to be received after the war. That German commercial relationships will be disturbed and rendered negative by some of her present enemies there can be no doubt, and for some years at any rate things "made in Germany" will be excluded from their markets. We may well ask ourselves, What will be the position in regard to medicine? We have held for some time that the Germans will look to their medical men to assist in breaking down the barriers of exclusion between their nation and their neighbours. And we may expect an influx of German doctors into Britain as part of a set plan and purpose to further their hopes of "breaking the line" of exclusion.

Medical men in Britain have had many German friends in the same profession, and that advantage will be taken of this by the German authorities cannot be doubted. These emissaries from Germany will approach us in various ways, either individually or collectively. They may come to read papers, if possible, at the British Medical Association meeting or at one of the many medical societies of the country. This form of attack may be met with a distinct negative by the British societies, and for some years at least it may be possible to ward it off. But how about when a German doctor comes to a private house, sends up his card, and desires an interview. He may have been an old friend or acquaintance, and it is difficult to know how this form of attack is to be eluded. If he is allowed an interview one can foretell pretty confidently what form the conversation will take. Most likely the caller has been supplied with a form, a statement carefully drawn up by the authorities. He will refer to the miseries of war; to the iniquities of the Kaiser; and condemn militarism in the strongest language. He will call himself a Socialist, one who hates war and Kaiserdom, and who daily lamented during the war the treatment of the British prisoners by his people. He will tell what he did to ameliorate the suffering of the British soldier in captivity and in hospital. He will condemn, with the usual German explicatives, all deeds of cruelty practised by his countrymen as a thing of abhorrence, and he may even shed crocodile tears over the woes he witnessed during the war. How are these "gentlemen" to be met? Are we to show them the door? Are we to enter into a discussion on the matter, or how are we to behave? It may be that in days gone by we have received great hospitality at his hands in Germany. He asks us now, in view of his previous acquaintance, to introduce him here and there, and to get him invited to home functions, literary or social.

During his conversation with his host or others he will introduce him to, he will take great care to bring the evils of German ways to the forefront in all conversations, and speak of the blessing of British rule in laudatory terms. He will refer to the greatness of our leaders and the bravery of our soldiers; of the greatness of our sea-power, and the blessings it has conferred on the peoples of the

earth. He will also invite the medical men of this and many other countries to attend medical functions in Berlin or elsewhere in Germany, and by a profusion of social hospitalities send us home again full of the legend that between doctors there can be nothing but respect and friendship amongst men engaged in the fight against disease.

Are we to receive all this in the spirit of the old song, "Trust him not, he is fooling thee"? or are we to believe this man's soul to have been purified and his whole character changed by what has occurred during the past four years?

We are afraid from what we know of the German that his language and his professedness of admiration and friendship is mere camouflage, and a means to an end to ingratiate himself with British folk. Some of us no doubt are acquainted with German doctors to whom such a state of opinion and behaviour is impossible. But the whole German people have so deceived us by their hymns of hate, their systematized cruelty, of organized murder of women and children, that the thought comes to us, Have we been deceived all along? and that their pre-war state of mind was but that of the wolf in sheep's clothing as much then as it may be now. We have not sounded the depth of the modern German, trained from the cradle in a spirit of brutality which even the scientific and humane profession of medicine has not ameliorated.

We have started a problem of behaviour concerning these German doctors which we are afraid we cannot solve. We would appeal to some of our readers to help us towards a solution of this difficulty, and we shall be glad to publish any opinions and thoughts on the subject which they may send to us. J. C.

Abstracts.

SCIENCE AND THE FOOD ADMINISTRATION IN WAR.[1]

ALTHOUGH our public press has given scant notice of the existence of an Inter-Allied Commission on alimentation, designated in some reports as the Scientific Food Commission, the significance of its organization deserves to be widely heralded. The Inter-Allied Conferences in London, Paris and Rome, of representatives of France, Italy, the United Kingdom (Starling and Wood), Belgium (Hulox), and the United States (Chittenden and Lusk) mark the recognition of a principle—the essential propriety of calling on men of science trained in the study of nutrition for expert advice in relation to the food problems now confronting the world. This was not done by the nations involved in the earlier days of the War. Physiologists and scientifically trained advisers or administrators received little consideration from the European Governments; indeed, to an outside observer it seemed almost as if the expert in nutrition had been consistently "snubbed" in the management of the food situations. It remained for America, long taunted as the land of the "practical" man where dollars and cents leave little place for theoretical science, to show to the world the correct way to approach questions that cannot be solved satisfactorily or definitively by the political strategist or the untrained propagandist.

The food administration of the United States—an organization or division of the Government made indispensable early in the War—has from its very inception recognized the supreme importance of consulting scientific men in those fields in which they may be presumed to have superior wisdom. The Food Administrator, Mr. Hoover, is himself a man trained in scientific methods and in full sympathy with the aims of science. He insists on scientific surveys as a basis of all important actions; and while he is intimately conversant with the industrial and economic factors that are so important in general in food control, this "food dictator" never loses from his mind the physiology, the psychology or the sociology of nutrition. As a member of the administration staff has expressed its purpose: a fundamental aim is to bring all of the men who deal with the particular aspects of the problems in trade in close contact with the scientist, so that each may appreciate the other's point of view. Thus it would be a serious error for any Government to attempt a reorganization of the dietary of its citizens or even of its domestic animals that was contrary to the dictates of scientific intelligence. Who is to determine what changes are safe, what reductions or substitutions can be made without detriment to health or efficiency? Who shall be the critic of the food factors on which national vitality hinges if not the men who have spent their lives in the investigation of the science of nutrition?

To its credit let it be reiterated that the United States Food Administration has never failed to understand the value of scientific experts. Any propaganda having for its object the encouragement of food production and of economy in the use of food should be organized and directed by men of science well acquainted with the subject. This elementary principle was at first neglected in Great Britain. Even in Germany, the counsel of the physiologist was not sought at first; although it appears that the truth of the elementary principle is beginning to be recognized in Germany too, where voices are being raised in favour of consultation of scientific and medical experts by the authorities.

How well the scientific side of our national Food Administration has been organized is perhaps best exemplified by the character of its representatives. Amid the criticisms levelled at so many branches of the Government in its gigantic efforts to win the War, it is worth while to point to one branch at least in which correct principles have been followed in pioneer ways. Guided by the judgment of consulted experts, the medical profession may and should join in the efforts to dispel public alarm when wheat is forced to give way to other cereals, when the allowance of meat is reduced, when sugar is restricted to 3 lbs. per person per month, and when other innovations are suggested in the interests of inter-allied food economy. We can do this the more gladly now

[1] Abstracted Editorial from the *Journ. Amer. Med. Assoc.*, August 3, 1918.

that our Allies too have recognized the value of scientific advisers in a conference that studies the food resources, the food needs, and the nutritional conditions in the allied nations at war.

TREATMENT OF MALARIA BY DISODO-LUARGOL.[1]

By W. A. Murray and R. W. Harold Row.

A paper on the treatment of two cases of malaria by disodo-luargol, by Dr. Louisa Hamilton and Dr. Morna Rawlins, having appeared in the *Lancet* of April 6, 1918, caused the writers to treat six cases, each of which had asexual parasites in the peripheral blood. Of the six cases complete treatment was carried out in four, with the following results: In one case a clinical and parasitic relapse occurred eleven days after the end of the treatment; in one case the asexual parasites have never disappeared; in the other two cases, although the parasites disappeared, in each case they have reappeared—in one immediately, in one four days after the last injection. Consequently, there is no case in the four in which the disodo-luargol can be considered to have been even temporarily successful, for the presence of asexual parasites in the blood means that a clinical relapse must be regarded as only a question of time. Further, the comparatively long time taken for the asexual parasites to disappear from the blood (sixteen, ten, and twelve days, respectively, in Cases 3, 4, and 6, and not at all in Case 5) does not lead one to anticipate that disodo-luargol is likely to be so effective in the treatment of malaria as quinine, which normally achieves this same result in four days.

There is also a technical point to be mentioned in connection with the use of this drug. The solution being almost black, it is difficult to be certain that the needle is in the vein, as the back flow of blood cannot be seen, and if the fluid be injected into the surrounding tissues, as happened to us on one occasion, considerable irritation is caused.

In addition to the six cases described above, we have had under observation in this hospital five patients who had partial courses of disodo-luargol at another hospital, and four of these cases have had relapses, both clinical and parasitic, while here.

To summarize, disodo-luargol is no specific for malaria, and there are several reasons, both clinical and technical, to render it far less suitable for use than quinine.

CŒLIAC DISEASE.[2]

By G. F. Still.

(*Continued from p.* 204.)

There are cases in which after long-continued treatment a sort of *modus vivendi* is reached, which, though it cannot be called recovery, might perhaps be described as permanent improvement.

Morbid Anatomy.

As evidence of specificity one naturally turns to morbid anatomy and to bacteriology, and, failing these, one seeks a specific cause in disturbance of function in some particular organ or organs. How far is it possible to demonstrate by such inquiry that in so-called "cœliac disease" we are dealing with a morbid entity due always and only to one specific cause?

I must first consider its morbid anatomy, and, unfortunately, the available records and observations are meagre in the extreme.

Dr. Gee himself, in his original paper on the subject, says: "Naked-eye examination of dead bodies throws no light upon the nature of cœliac affection. Nothing unnatural can be seen in the stomach, intestine, or other digestive organs. Whether atrophy of the glandular crypts of the intestines be ever or always present I cannot tell."

Dr. R. A. Gibbons, also, writing a year later (1889) than Dr. Gee, says: "Examination of the bowel after death has led to the discovery of nothing."

The only detailed record of a post-mortem examination which I have been able to find is that published by Drs. Poynton, Armstrong, and Nabarro (1913) in the *Proceedings* of the Royal Society of Medicine.

It refers to a boy who had had a prolonged attack of diarrhœa lasting eight months in the second year of his life, and again at 5 years began to suffer with diarrhœa, which recurred at intervals until his death at the age of 9 years. The stools were at times of the pale, creamy, offensive character which suggests cœliac disease, the abdomen was much distended, and the boy much wasted. His weight at 8½ years was 27 lb. No record was kept of his height, but he was, as I remember—for he was under my care repeatedly at a convalescent home—much below the normal height for his age. Eventually an attack of vomiting, with severe abdominal pain, for which no cause could be found at autopsy, ended in collapse and death.

The noticeable features at post-mortem were thickening of the walls of the whole intestine both large and small, the mucosa of which shared in the thickening and showed also patches of acute congestion; the solitary follicles were prominent in the large intestine. Peyer's patches in the small were not enlarged, the stomach wall and mucosa showed similar thickening and congestion.

The liver was large, pale, and soft, and showed marked fatty change. There was no obvious naked-eye alteration in the pancreas; there was no tuberculosis anywhere.

Microscopic examination showed much small round-cell infiltration of the mucosa and submucosa, but more in the stomach and small intestine than in the large bowel. In places there were small blood extravasations in the mucosa. The liver showed fatty degeneration. The pancreas showed "marked increase in the interlobular fibrous tissue, particu-

[1] Abstracted from the *Lancet*, September 14, 1918.

[2] Abstracted from the *Lancet*, August 10, 17, and 24, 1918.

larly that surrounding the ducts," indicating, it was thought, some interlobular pancreatitis.

In connection with this case I will mention one which showed post-mortem appearances so closely similar that they point almost certainly to the same condition.

Clinically the diagnosis had been in question on account of the unusually rapid course and also the comparatively late age at which the symptoms began. A boy aged 7 years was under my care nineteen weeks with looseness of the bowels, amounting at times to actual diarrhœa. He had been sent into hospital as a case of tubercular peritonitis on account of wasting and enlargement of the abdomen, but one early began to doubt this diagnosis, for the stools at times were suggestive of cœliac disease, and, moreover, there was, with œdema and purpura, frequently recurring tetany.

Examination of the stools showed no dysentery bacillus, but a large predominance of a bacillus which could not be exactly identified but resembled in many respects the *Bacillus lactis aerogenes*. On the ground that the case was probably one of cœliac disease the boy, after several weeks of unsuccessful treatment, was put upon a fat-free diet and at once improved greatly, as cœliac cases usually do upon such feeding, but a few weeks later had a relapse of looseness with much distension of the bowel, and died of exhaustion.

At post-mortem there was about half a pint of serum in the abdomen, and the bowels presented a remarkable appearance; they were of a dark slaty colour externally, and looked, and were, thickened throughout; the stomach did not show this appearance. On opening the bowel the mucosa was seen to have a swollen and congested appearance throughout, but there was no ulceration.

The liver weighed 19 oz., in spite of being considerably congested; the normal average weight at this age is 23·6 oz., so that the findings in this case confirmed the results of clinical examination by percussion, to which I drew attention in my previous lecture. The pancreas weighed 1 oz. and showed nothing abnormal to the naked eye. There was no tubercle anywhere.

Microscopic examination of the duodenum, ileum, and colon showed much small round-cell infiltration of the mucosa and submucosa, and this was most marked in the duodenum. The liver showed engorgement with blood, but otherwise nothing abnormal. The pancreas showed some excess of fibrous tissue, especially around the ducts, the appearance being suggestive of some pancreatitis.

There was thus, except in the absence in this case of fatty change in the liver, a close agreement in the post-mortem findings in these two cases. Unfortunately scrapings were not taken from the mucosa of the bowel, so that its bacteriology remains doubtful.

Morbid Anatomy.—In these two cases there was an inflammation involving the whole intestinal tract, an inflammation obvious to the naked eye as well as to microscopic examination; moreover, the marked thickening of the wall of the bowel was something quite unusual.

The character of the stools tends to change as the disease progresses.

The pancreas has an increase of fibrous tissue; the pancreatitis, if it be so, may be merely secondary.

Bacteriology.

If the morbid anatomy, so far as it has been observed, affords no reliable clue to the specific cause of this affection, it gives at least ground for conjecture that some specific bacterial agent may explain the appearances described in the bowel, and though, as I have suggested, these may be secondary rather than primary, the finding of an organism constantly, even where these secondary changes had already occurred, would be presumptive evidence that the organism found was the primary cause of the disease; at any rate, it would give good ground for seeking further evidence of its specificity.

The earliest observations of which I am aware are those by Herter (1908). He studied the fæces of these cases, which he called "intestinal infantilism," and considered that the most noticeable feature was the predominance of Gram-positive organisms. Two, in particular, he considered to be sufficiently constant and predominant to justify the suggestion that they may be causal—namely, a bacillus which he called *Bacillus infantilis* and the *B. bifidus*. Both, however, are by his own admission found in the stools of healthy nurslings, and some observers have found that the *B. bifidus* is common in the normal stool at this stage, and have found both of them also in ordinary cases of infantile diarrhœa.

It is therefore clear that neither of these is specific in the sense that its presence is evidence of the disease, nor even in the sense that if it becomes pathogenic at all it will produce this particular symptom-complex. Indeed, the only evidence of pathogenicity mentioned by Dr. Herter in the case of *B. infantilis* is the experiment on a dog which was fed on milk first sterilized and then inoculated with *B. infantilis*. The animal developed a persistent diarrhœa, which ceased only with the discontinuation of the *B. infantilis* milk. A second trial gave a similar result. Injected into guinea-pigs, neither *B. bifidus* nor *B. infantilis* showed any pathogenicity.

In addition to these organisms various cocci were found in the stools, but no causal influence is claimed for them.

As confirming the pathogenic rôle of the *B. infantilis* and the *B. bifidus*, Dr. Herter points out that these organisms become less and less noticeable in the stools as the child improves, when such organisms as the *B. coli* and *B. lactis aerogenes*, Gram-negative forms, take their place.

The findings are far from conclusive of any specific infective cause. The most suggestive part is the finding in some cases of a dysentery bacillus, and perhaps the more significance is to be attached

to this inasmuch as the serum of some cases was found to agglutinate this bacillus.

Possibly their presence may be a mere epiphenomenon.

FAILURE OF FAT ASSIMILATION.

A homely method of demonstating this is by the sooty, spluttering flame when a match dipped in these fæces is set alight. Microscopically, also, it is evident in some of the stools by the large excess of fatty acid crystals, and sometimes by the obvious excess of fat globules, but the only certain gauge is quantitative chemical analysis.

Failure to absorb the fat of the food may be due to various causes, but traced to their sources these fall into two categories: (1) Lack of preparation of the fat for absorption through deficiency of the fat-splitting function of the bile or of the pancreatic secretion; (2) failure of the intestinal surface to absorb, in spite of the fat being sufficiently prepared by the fat-splitting processes and saponification.

Question of Hepatic Insufficiency.

The pale colour of the stools led Dr. Cheadle to suppose that the deficiency was mainly one of bile.

Speaking (1903) of the stools in these cases, which he grouped under the heading Acholia, he said: "They are obviously as destitute of bile as those of complete obstructive jaundice." More in accordance with recent observations is Dr. Gee's statement: "The paleness is commonly supposed to signify lack of bile, but the colour of fæces is a very rough measure of the quantity of bile poured into the duodenum, nay, more, stools are not always so wanting in bile as they seem to be, in particular opaque white food such as milk curd" (he might have added, "milk fat"), "undigested, will hide the colour of much bile."

There is no hint of any organic change in the liver.

On the whole there seems to be evidence that one of the fat-spitting agents, the biliary secretion, is deficient, at least in some cases.

Question of Pancreatic Insufficiency.

There are indications in some that it is defective, but in the majority all the tests applied proved negative.

Laboratory investigation of the stools gives but little support to the idea of pancreatic insufficiency.

There is no failure in the splitting of fats, and if one assumes that the pancreatic secretion plays the chief part in fat-splitting the idea of any "profound inhibition of the function of the pancreas" is clearly untenable.

Failure of Fat-absorbing Power of Intestinal Mucosa.

It would seem that, although in individual cases the biliary secretion may be found deficient, there is no interference with the fat-splitting process which prepares fat for absorption, and therefore we must conclude that the fault lies in failure of the absorptive function of the intestinal mucosa.

But apart from the difficulty of proving that purely functional failure of intestinal absorption ever occurs, there is such definite clinical evidence in a certain proportion of cases of cœliac disease that some catarrhal or inflammatory condition is an early, if not the earliest, pathological change that it seems a more probable view that even in the cases which appear to begin quite insidiously there is some degree of catarrh, for these, like the others which start with definite diarrhœa, show before long more or less of the typical recurrent looseness of the bowels.

The first step in the disease may well be a catarrhal condition of the mucosa in the small intestine, where in health the absorption of fat occurs chiefly or entirely.

TOXIC ABSORPTION.

One of the noticeable symptoms, especially in severe cases, is dropsy occurring chiefly in the distal parts of the limbs and also the face, and sometimes associated with ascites.

There is no proof that the œdema in such a case is due to toxic absorption from the bowel, but the association suggests it.

Another symptom which is worthy of consideration in this connection is purpura.

This, like œdema, is common enough as a late symptom of many diseases which end with emaciation and exhaustion, but it is particularly noticeable that in cœliac disease purpura is sometimes a recurring symptom for years.

For instance, in a girl who died at the age of 9½ years after suffering with cœliac disease from the age of 20 months, bruise-like patches of purpura appeared on many occasions from the age of 2½ years up to the time of her death, although during the greater part of this time she was well enough to be up and about.

In another case, a boy, aged 7¼, in whom the disease had been present for five years, but who was still well enough to get up and walk about, patches of purpura occurred from time to time, and noticeably in relation to unhealthiness of the stool; when the stools improved and became more normal the purpura would cease to appear, then a particularly unhealthy stool, without diarrhœa, would be associated with a fresh patch or two of purpura.

Often, so far from there being any increase of frequency of stools, there has often been a noticeable decrease in their frequency, perhaps no stools at all for twenty-four hours, just before the purpura appears. The non-frequency of stools may be more than a coincidence; delay in the evacuation of the unhealthy fæces may be a determining cause of the absorption which results in purpura.

But, even if this view be correct, the particular substance which causes the purpura is still to seek.

Mere constipation, even when most chronic and severe, does not cause purpura, although there may be various symptoms suggestive of toxic absorption, headache, lassitude, sallow skin, and so forth; it is probable, therefore, that the cause is to be sought either in the products of particular bacteria or in the chemical products of intestinal putrefaction,

and only when these hypothetical substances are present does absorption from the intestine produce purpura.

It has been suggested that indol may be the poison in question; and when indol is being formed in large quantities in the bowel this is indicated by a marked indican reaction in the urine. It has been specially noticed that in many cases of purpura a marked indicanuria is present; in one of my cases of cœliac disease I found a very definite indican reaction during the eruption of purpura, and this reaction became much less, in fact, almost entirely absent, when the purpura ceased to appear.

Apart from œdema and purpura, the occurrence of tetany in cœliac disease probably points to toxic absorption.

Arrest of Growth.

Amongst the various possibilities which present themselves there is one which ought to be considered—namely, that deficiency of fat absorption may be sufficient cause for arrest of growth.

It is not apparent, however, how deficiency of fat in the diet has any special influence in arresting growth.

The disease which might have been expected to throw most light upon this point is rickets.

There is strong evidence that fat deficiency in the diet is a large factor, perhaps the determining factor, in the causation of rickets; moreover, there is clear evidence of deficient calcium deposit in the rachitic bone. Here, then, we seem at first sight to have the required link bringing the fat absorption into direct relation with formation of bone.

But if this view of the pathogeny of rickets is correct we are faced by another difficulty in regard to cœliac disease—it should be associated closely with rickets; whereas one of the very striking facts which I have already mentioned in connection with its symptomatology is the entire absence of rickets in most cases. Conversely also, if the failure of fat absorption be the cause of the stunting in cœliac disease, arrest of growth might be expected far more commonly than it occurs in rickets.

The problem is evidently a complicated one, and it is not rendered less so by a comparison with such a condition as the congenital steatorrhœa described by Garrod and Hurley, in which the passage of 80 per cent. of fat in the fæces, amounting to a loss of 25 per cent. of the fat intake, was associated neither with arrest of growth nor with rickets.

Dietetic Treatment.

The outstanding feature of cœliac disease is failure of fat assimilation.

This is the reason of the value of a diet from which fresh cow's milk is altogether excluded. No other item is of equal importance. Experience shows that it requires emphasis, for the tendency is to put such a case upon milk, and more milk, as the one thing needful, whereas nothing is more likely to retard recovery.

The best results are to be obtained in the dieting of these children by reducing the fats to a minimum, and as the food in which fat is chiefly given at the age when these children come under treatment is cow's milk, these observations have applied chiefly to this particular form of fat.

Dried Milk with Reduced Fat.

Replacement of fresh milk altogether by a dried milk containing only a small proportion of milk fat answers.

One of the most successful substitutes for cow's milk is asses' milk.

Fats other than those present in milks have als proved unsuitable.

Carbohydrates.

The diet must consist of something more than a milk very poor in fat if any continuous improvement of nutrition is to be obtained.

There is apparently some difficulty in dealing with starches, though much less than with fats.

Unfortunately, one form of starch which seems particularly liable to aggravate the symptoms is bread. Rusks have seemed less harmful than bread, probably owing to the fact that the starch in them is partially dextrinized; they help to satisfy the child's craving for something solid. For this reason, though they contain very little carbohydrate, biscuits made with dried milk with just enough wheaten flour to give a crisp consisteney may be given. Sugar is allowable only in small quantity.

A form of carbohydrate which generally suits these cases is "Revalenta," prepared from lentils; this made thin with a solution of the dried milk and sweetened with sugar, though not very palatable, is generally taken well. Rice boiled in water for three or four hours so that it is almost a jelly is another form of carbohydrate which has usually succeeded.

These foods, with the addition of chicken broth or veal broth and sweet jellies, have made up the total dietary, in some cases, for a year or more, and if anyone tries to draw up a menu from this list he will find that it is meagre indeed. If eggs are tolerated it eases the difficulty considerably. Pounded chicken, or fish, or meat, or brains, generally make the looseness of the bowel worse, and are only suitable when the child is already improving.

Apart from the fact that such a diet is unsatisfying to the child, it is definitely scorbutic.

Other Diets.

Various have been the efforts to find a diet upon which these children will do well.

One of the most remarkable is that mentioned by Dr. Gee: "A child who was fed upon a quart of the best Dutch mussels daily throve wonderfully well, but relapsed when the season for mussels was over; next season he could not be prevailed upon to take them. This is an experiment," he says, "which I have not yet been able to repeat."

There may have been more reason in this method of feeding than at first appears, for, like most of

the diets which have succeeded, it is one containing a low proportion of fat. Moreover, while containing a high proportion of proteid, it contains, of course, no carbohydrate. The mussel contains 12·5 per cent. of proteid and only 1·6 per cent. of fat.

In some cases a so-called "fat-free" diet answers.

From this even the dried milk and egg are excluded, and the diet consists of rusks, Robb's biscuits, jellies, chicken, and veal broth, rice boiled in water, revalenta, mashed potato, pounded chicken or fish, barley water or weak tea with sugar. On this diet there has usually been great improvement, and in six cases slow but steady recovery.

In this diet the potato fulfils a double purpose by not only providing a considerable number of calories, but also a most effective anti-scorbutic. It has seemed to me to be better tolerated in this fat-free diet than when given in a diet including milk, dried or otherwise. This impression is confirmed by one's experience in some of the commoner digestive disturbances of childhood, where one has often noticed that the combination of oily substances—for instance, butter—with potato seems to render the potato particularly indigestible, possibly for the reason already suggested, that the fatty material forms an envelope around the starch granules preventing the diastasic action of the amylase of the salivary and pancreatic secretions.

Even when fat is eliminated entirely or almost entirely from the diet these children still show a remarkable freedom from rickets.

Inunction with peanut oil (oleum arachis), 2 dr. being rubbed in twice daily for about fifteen minutes caused improvement in several cases where the disease had already lasted two or three years without any permanent progress.

Pancreatic extract and ox-gall cause improvement neither in the stools nor the child's health.

Most of the astringents, whether vegetable or mineral, have proved useless in my hands; the only one which has an effect is castor oil given in small doses, three times daily; it usually causes more or less improvement.

A mixture of 5-minim doses of castor oil with salol 2 or 3 gr. in mucilage and water has such a pronounced effect in improving the stools and checking looseness that in several cases the child took it almost continuously for some years, and the parents stated that any attempt to discontinue it was usually followed before long by deterioration in the character of the stools, so that the medicine had to be resumed.

Less reliable than castor oil is silver nitrate, which in doses of $\frac{1}{6}$ or $\frac{1}{4}$ gr. ter die seems to reduce the looseness of the stools in some cases.

Bismuth is of little, if any, value in these cases, perhaps because it was used in the traditional doses of 10 gr. or even 5 gr. three or four times a day, whereas the radiographers have taught us that bismuth can be taken by the ounce without ill-effect, so that recently infants in my ward sometimes have 30 gr. of bismuth carbonate every three hours, and a child of 3 as much as 60 or 70 gr. several times a day.

Intestinal Antisepsis.

Other drugs have been tried in this affection with the idea of intestinal antisepsis.

In one, at the age of about 6 years, iodoform $\frac{1}{6}$ gr. was given for six months, apparently with markedly beneficial effect.

Salol has also seemed to do good.

Perhaps in the same category should be mentioned ionization with sodium salicylate at one electrode; this was done in one case under my observation. A 2 per cent. solution of sodium salicylate was used on one pole on the abdomen. During this treatment, which was carried out for many weeks, the child very definitely improved, though she subsequently relapsed and died.

Vaccine therapy has produced little or no effect.

Of internal secretions thyroid cause no improvement. In one case polyglandin was followed by an increase of height of $\frac{3}{8}$ in. in fourteen days and another $\frac{1}{4}$ in. in the next twelve weeks, but the child at the same time had improved so much in her power of assimilation that she was able to take an ordinary diet in place of the restricted special diet, so that growth might have been due to this rather than to the drug.

IMPORTANCE OF DIET.

To sum up, it would seem that drugs, while not entirely impotent in the treatment of this condition, have a very limited scope, and that chief reliance is to be placed upon scrupulous care in dieting. The element in the food which requires most consideration is the fat, and the form of fat which seems most obnoxious to children affected with coeliac disease is the fat of cow's milk. If this be borne in mind it is nearly always possible to obtain marked improvement in these cases, and a large proportion of them can be coaxed back after many months or years of patient perseverance with a very restricted diet to health, and even to an average power of assimilation.

Notes and News.

WHEAT NOT NECESSARY.—We are accustomed to regard wheat as a more or less indispensable article of diet. It is not. It is an article of luxury, and absolutely nothing else. Wheat possesses over oats, corn, and rice absolutely no nutritional quality for man or beast. It has no more protein, and no better protein. It has no more fat, and no better fat. It has no mineral salt better or in larger amounts. It has no more fuel or better fuel. It is just *one* of the cereals, and there is not the slightest evidence that it is the best one, because so far as comparative tests are concerned in animals, it is not the best one, it is very far from the best one.—A. E. Taylor, M.D., U.S. Food Administrator.

Original Communication.

HEART BLOCK IN A SUDANESE.

By ALBERT J. CHALMERS, M.D, F.R.C.S., D.P.H.
Director, Wellcome Tropical Research Laboratories,
AND
Captain E. GIBBON, M.B, R.A.M.C.
Attached the Egyptian Army, Khartoum.

CONTENTS. — *Introductory — Sudan Case — Diagnosis—Remarks—References—Illustrations.*

Introductory.—Slowness of the pulse, associated with occasional syncopal attacks, was probably first recorded by Morgagni in 1761, but it is to Adams in 1827, and more especially to Stokes in 1846, that the medical world became acquainted with this syndrome, which is often called "*Stokes-Adams Disease*," in which interest has been much stimulated during the last twenty years by the anatomical work of His, Tewara, Keith, and others, by the physiological labours of Gaskell and Erlanger, and the pathological researches of Keith, joined to the clinical observations of Sir James Mackenzie, Sir William Osler, and others.

Many cases have now been recorded in the temperate zone, where Blachmann in 1909 gathered together some 177, while Erlanger in 1905 described two cases in coloured people in the United States.

We have met with cases of the disease in Europeans living in the Tropics, but, in twenty-one years' medical work therein, we have never met with a case in a native of tropical Africa living in that Continent, and as we have been unable to find any reference to the disease in such tropical medical literature as is at our disposal here, and as it is not mentioned in the chapter on the Diseases of the Circulatory System in Castellani and Chalmers' Manual, it seemed to us that possibly a very brief record of the occurrence of this well-known disease in a native living in the Tropics might be of some utility.

Sudan Case.—The patient in question is an old man of some 65 years of age, who was born in Bornu, and who, as a young man, was taken along the dreadful forty days' road to Egypt, and there sold as a slave for Tripoli.

Eventually he returned to Egypt and enlisted in the Egyptian Army in 1896 at Alexandria, and in due course was sent to the Expeditionary Force at that time advancing on the Sudan.

In 1898 he contracted syphilis in Berber, in the Anglo-Egyptian Sudan. He was unable to obtain a full course of treatment for this infection, because he was required to accompany the force which eventually fought the battle of Omdurman. Because of this lack of treatment he appears to have had severe primary and secondary symptoms, from which, however, he subsequently made a good recovery.

With regard to his other illnesses, he appears to have suffered from cholera in 1895, and to have been liable to attacks of malarial and other fevers from time to time, as well as attacks of bronchitis, but none of these appear to have been of a severe nature.

His present illness is believed to have begun in 1913, when he was a convict.

He says that one day when working on a road he was hit over the cardiac area by the butt-end of an axe, and that one month subsequently he had his first attack of dizziness and faintness, during which he fell to the ground, and for a short time became unconscious. This attack was repeated once again before he was liberated from jail.

Since then he has suffered from two or three attacks of dizziness every year, but they have not been as severe as the first two, and he has neither fallen to the ground nor lost consciousness during them, though they appear to have duly alarmed him.

Early in March of this year, while stationed at Taufikia on the White Nile, he was "en route" for the market one morning, when he suddenly became so dizzy that he fell to the ground, but did not become unconscious. He was removed to the local hospital, where the slowness of his pulse-rate was duly noted, and he was despatched to Khartoum for diagnosis.

Since his arrival in this town he has had neither attacks of vertigo nor loss of consciousness.

His general health appears to be quite good, and apart from the scars on his penis there is no evident sign of syphilis, and he is a robust, intelligent old man. Indeed, his intelligence is quite remarkable, while his memory appears to be good, and his statements, as far as they can be checked, to be accurate.

His temperature is normal, his pulse-rate is about twenty-five beats per minute on the average, and his respirations, which are largely abdominal in type, vary in force and frequency, being at times frequent and deep, and at other times almost imperceptible, though the tracings show that they are still frequent (*vide* Tracings IV and V).

His liver is slightly enlarged downwards, but otherwise there is little of importance to relate with regard to his organs other than those of circulation.

His urine measures about 950 c.c. per diem and has a specific gravity of about 1018, is acid in reaction, and contains a very slight trace of albumin and no sugar.

His systolic blood-pressure, as taken by the usual mercurial instrument, measures 160 mm. of mercury, while his vessels, as far as one could judge clinically, were not markedly atheromatous.

With regard to the heart, the apex beat is situate in the sixth interspace about 1 in. below the nipple and about $\frac{1}{2}$ in. to the outside of that line. The area of absolute dullness appeared to be increased.

The apex beat is forcible and gives rise to, not merely the direct beat, but also to a diffuse after movement of the wall of the chest in the immediate neighbourhood.

The apex beat and the pulse (*vide* Tracing II) agree in rate.

On auscultation, a little distance inwards from

the apex, two extra beats could often be heard when we first saw him, and we believed that possibly these might be due to the auricular contractions presently to be mentioned. We noted a mitral systolic murmur, and a venous pulse in the neck was obvious as a rule.

Diagnosis.—The outstanding feature in this old man was his slow, regular pulse, about twenty-five beats per minute on an average. According to Sir James Mackenzie, cases of diminished frequency of the pulse can be divided into four classes:—

(1) Those where all the chambers of the heart participate in the slow action.

(2) Those where the slow pulse-rate is due to a missed beat, the ventricle having contracted, but the resulting pulse wave being too feeble to reach the wrist.

(3) Those cases of Nodal Rhythm where the auricle has ceased to beat or does so synchronously with the ventricle.

(4) Those cases where the stimulus is blocked between the auricle and the ventricle, so that the auricle beats at its normal rhythm, while the ventricle does not respond to the auricular systole, but pursues an independent and slow rhythm.

It is obvious that, in order to classify our present case, it was necessary to study the cardiac movements by means of some instrument, and we did so by means of Mackenzie's Polygraph, an instrument which we have used in Ceylon and in the Sudan without any great climatic difficulties.

We keep the rubber tubing in carbon dioxide gas in bottles, bringing the end through the cork and closing it with a piece of glass rod. By this arrangement a given length of tubing can be cut off without disturbing the gas. The rubber sheeting for the tambours we keep in pure glycerine, and we replace the rubber on the tambours very frequently, and always test them before use, as we find that minute apertures appear, which, of course, spoil the efficiency of the instrument. In a hot dry climate like this we find that the ink evaporates very quickly, and therefore we mix it with a certain and varying amount of glycerine, according to the air temperature.

With this instrument we took from our patient the tracings shown in I, II, III, IV, and V.

Tracing I shows the time in fifths of a second of the jugular and the radial pulse. Tracing II indicates the time, the apex beat, and the radial pulse. Tracing III depicts the time, the carotid pulse, and the radial pulse, while the other two show the abdominal respiratory movements.

All tracings were taken at one and the same sitting, the time and radial pulse were not varied, so that only the middle curve was varied.

The jugular tracing is complex, and we analysed it by following the method laid down by Sir James Mackenzie on pages 110 and 111 of the first edition (1908) of his book, entitled "Diseases of the Heart."

The result of our analysis is shown on the tracing where c = carotid, a = auricle, and v = ventricular wave.

If this tracing is examined, it will be observed that there are three auricular beats to one ventricular contraction, as shown by the apex beat and by the radial pulse curve.

It will be further observed that while one of these auricular beats agree with a ventricular contraction, the other two auricular beats do not so agree.

To show this more clearly, we have followed Sir James Mackenzie and prepared a diagram depicting the auricular beats, the a-c interval and the ventricular contractions.

This diagram shows that the impulses causing two auricular beats fail to reach the ventricle in sufficient force to bring about its contraction, while the third does so.

It also shows that this state of affairs continues regularly, and in the long tracings which we took when we first saw this patient the regularity was most marked.

If the interval occupied by three auricular periods be measured and then compared with the corresponding ventricular period, it will be noted that the two agree. We therefore conclude that the *heart block is incomplete*, and that the beats of the ventricle are in response to an impulse starting in the sinu-auricular node.

The intervals between a ventricular contraction and the next following are, however, not exactly the same, and this holds good, but more markedly for the auricle, and these differences we attribute to *Sinus Irregularities*, and we suggest that possibly these may be caused by the peculiar type of respiration which was present when we took these tracings, and the nature of which is shown in Tracings IV and V. This prolongation of the interval between auricular contractions was noted by Jellinek and Cooper in their fourth case.

The factors, therefore, which were present in this patient when we examined him were the following:—

(1) The history of syphilis.

(2) The conductivity of the primitive cardiac tissue depressed, so that while the auricles beat on an average seventy-five times in a minute, the ventricles only contract some twenty-five times in the same period.

(3) The slight irregularity in the spacing of the ventricular beats, and the more marked irregularity in the spacing of the auricular beats.

Our diagnosis, based upon the above observations, was that the patient was suffering from some syphilitic lesion affecting the conductivity of the primitive cardiac tissue. As the disease has obviously lasted for years, it would appear more probable that the lesion was of the nature of a fibrosis rather than a gumma, and further, that at present there is incomplete, and not complete, blocking of the auricular impulses.

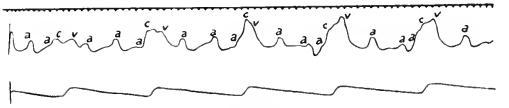
Our case is therefore classifiable in Sir James Mackenzie's fourth class of slow pulse or bradycardia.

But slow pulse associated with syncopal, apoplectiform, or epileptiform attacks constitutes the Stokes-Adams syndrome, and may be associated

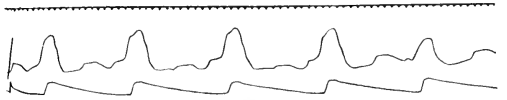
either with heart block or with disease of the vagi.

It is sufficiently evident that our case is one of Stokes-Adams disease associated with heart block, and that the slight cerebral anæmia caused by the imperfect action of the heart may be the cause of the irregular respiration, and by this means of the slight sinus irregularities, and when more marked of the attacks of dizziness and loss of consciousness.

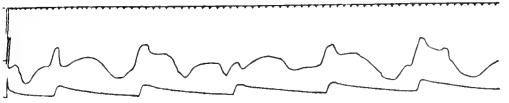
Remarks.—Sir William Osler has cured cases of recent heart block due to syphilis by the use of anti-syphilitic remedies, but if our diagnosis is correct that the lesion is fibriotic, then these remedies are unlikely to do good in our case.



Tracing I.
Radial and Jugular.



Tracing II.
Radial and Apex.



Tracing III.
Radial and Carotid.

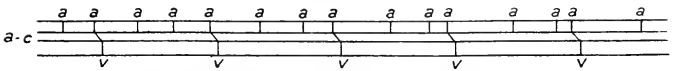
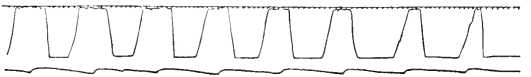
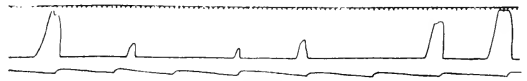


Diagram showing auricular and ventricular contractions and a-c interval.



Tracing IV.
Radial and Respirations.



Tracing V.
Radial and Respirations.

Further, as the old man was in excellent health otherwise, and as the cardiac condition was obviously not tending to progress rapidly, it appeared to us to be futile to attempt to give remedies.

We therefore followed the advice of Sir James Mackenzie, and while invaliding him from the Army, from which he received a due recompense for his services, we endeavoured to provide him with a light easy job which would avoid over-exertion.

Khartoum,
April 29, 1918.

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ILLUSTRATIONS.

The Tracings are taken at one and the same time by Mackenzie's Polygraph. In all the time marker records one fifth of a second.

Tracing I. Radial and Jugular.
a = auricle, c = carotid, v = ventricular wave.
Tracing II. Radial and Apex.
Tracing III. Radial and Carotid.
Tracing IV. Radial and Deep Respirations.
Tracing V. Radial and Shallow Respirations.
Diagram shows auricular and ventricular contractions and the a-c interval.

Beriberi with Œdema (P. Mauriac and D. Duclos, *Paris Médical*, June 15, 1918).—In an epidemic of twenty-one cases of beriberi in native troops from the Senegal, serving in France, the main features were the œdema, the disturbances on the part of the heart, and the mononucleosis in the blood. There was albuminuria in half the cases. The œdema predominated in the legs and spared the face and scrotum, but pulmonary œdema developed in some. Retention of chlorides seemed to be a factor, as the œdema subsided on a salt-poor diet. The men at first complained of pains in legs and chest, but seemed to forget them by the next day, except in one case, in which there seemed to be actual myalgia. All the men recovered except one. The diagnosis of beriberi is not very certain, as there was no tendency to polyneuritis, dyspnœa, or vomiting.

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Tropical Medicine and Hygiene

NOVEMBER 1, 1918.

MEDICAL MEN IN PARLIAMENT.

SOME stir is being made in certain circles in London and elsewhere in Britain to foster the idea of the need of more medical men in Parliament. Politics and medicine have up to quite recent years been considered as things apart. The healing of

the sick was not considered by any stretch of imagination as having anything to do with politics, and medical men who took up public affairs were looked upon as advertisers, and therefore to be looked at askance by professional circles and societies. This has to some extent been altered during recent years, and, as we know, a few have become M.P.s. Some have risen to Cabinet rank, and some have even reached the House of Lords after a career in the Commons. Dr. Walter Foster, after many years' service in the Lower House, was created a Peer; and Lord Lister was raised to the Peerage, but not by way of his political career. Dr. Addison is a Cabinet Minister. The late Dr. Farquharson of Finzean became a Privy Councillor. It would seem, therefore, that, taking the small number of doctors in Parliament, the proportion raised to posts of importance has been very satisfactory. Well and good; but although these men entered Parliament as doctors their University gowns were soon dropped, and they became prominent party politicians, with but little remembrance that the dissecting rooms and the hospital wards played any part in their career. They went into Parliament with good intentions, no doubt, of helping their medical brethren, but became immersed in the swirl of the political flood.

It might be thought, to read the names of men prominent in the Governments of other countries, that doctors took a foremost place in their political assemblies and cabinets. Few of these are Doctors of Medicine, however; they are Doctors of Philosophy, Ph.D.s in fact—a degree foreign to our Universities, and corresponding in some ways with our M.A. and B.A. degrees, only more limited in their range of subjects of study. The German Ph.D., for instance, is the common degree acquired after what is termed a study of philosophy, and held by teachers and by many newspaper men throughout that country. These teachers and newspaper men pass on into politics, taking their rather worthless degree with them. Those of us who are acquainted with pupils from this country who have gained the degree of Doctors of Philosophy at a German University are not impressed with the knowledge necessary to acquire the title. Nor can we regard the German newspaper men as men of either education or possessed of high qualities *as* newspaper men, whether as editors, letter writers, or reporters. As war correspondents they have been negligible in their attainments; they have never produced a man of outstanding parts as a war correspondent, either in enterprise or that vigour of tone or style which we are accustomed to find in British correspondents.

Their newspapers have had but little effect in the diplomatic affairs of the world; they are narrow and cribbed in their politics, and childish in their attempts to direct public opinion. Such are the men who bear the title "Dr." in political spheres in foreign countries for the most part, and they must not be confused with the same term in Britain.

Is it possible to have a man in our Parliament who, possessing a medical degree, can devote himself to the matters of public health, &c., pure and simple? Constituted as it is, a man must declare himself a Liberal or Conservative, and when thus classified it is impossible it seems to keep outside the environment of one or the other party. It may not be good that they should, but it would seem to annul the purpose which his medical constituents hoped would be the case.

The medical profession, as regards its influence upon politicians, is *nil*; many have time and again snapped their fingers at the doctors, and told them they did not care a rap whether the medical men supported them or not, for they as a body were without influence.

That a medical man's training is conducive to a liberal education there is no doubt; but that he can directly influence politics by reason of being a doctor is impossible. That he becomes a better politician by his training in medicine may be, and no doubt is, the case; but only indirectly from the fact that he is a doctor. In municipal work it is just the same. The ordinary member of the Board of Guardians cannot understand a medical man who wants better streets; to have better drainage, better food and water for the town is surely to be mentally afflicted they say, for he is cutting down his own practice by trying to keep everyone healthy. Such a man is acting contrary to the instincts of self-preservation, and he is a hopeless man to argue with or to deal with.

Will the sending of more doctors to Parliament effect any direct good to the medical profession? We doubt it; for as we see there is no room for such an one. The doctors in Parliament are doing excellent public work, not as doctors, but as well educated men, and we are proud of most of them. But we cannot see how they can keep out of party politics, and we fail to see what direct good they will be to the profession by being in Parliament as it is at present constituted; a brilliant exception lately is before us in the speeches of Sir Walter Cheyne, Bart., and we only hope that his courage will continue, and that he may set the example to others who may join the ranks of medical men in the House of Commons.

Cause of Leukæmia.—The *Nederlandsch Tijdschrift* summarizes an article by Wieczkowski in the *Przeglad Lekarski* relating that he succeeded in inducing a disease in a hen, resembling in some respects human leukæmia, by intravenous injection of pleural effusion from a young man who had developed acute leukæmia after a trauma. The leucocytes numbered 590,000, and there was pleurisy on one side. In the hen the hæmoglobin dropped from 55 to 9 per cent., and the bone marrow showed infiltrates, &c. The clinical picture differed completely from that with so-called fowl leukæmia.

Annotations.

Action of Sensitized Cholera Vaccine, K. Shiga, R. Takano, and S. Yabe, *Kitasato Archives of Experimental Medicine*, May, 1918).—The serum of vaccinated rabbits and guinea-pigs has a protecting power when injected into another animal. It is readily and rapidly absorbed and induces only very weak reactions. When an animal is immunized by vaccination, the cells acquire a tendency to secrete antibodies. The essential active immunity is thus a cell phenomenon; the antibodies generated and passing into the blood are only a supplementary phenomenon to this.

General Anæsthesia by Sacrococainization (G. le Filliatre, *Paris Médical*, June 15).—More than 2,000 applications of the *barbotage* method of spinal anæsthesia have confirmed the efficacy and harmlessness of the technique. With a single injection the entire spinal cord and its roots can be anæsthetized. Cocaine seems the best anæsthetic for this technique. The needle is 13 or 15 cm. long; the syringe has a capacity of 3 c.c., and with it is used a graduated glass tube of 30 c.c. The needle is introduced into the sacrolumbar space at the first sacral vertebra. After removing the guide, the spinal fluid flows and is received in the graduated tube. Then the syringe containing the solution of cocaine is attached and the piston is gently pushed in. Then it is allowed to slide back, having the patient cough if necessary. The piston is then pushed in again, and this manœuvre is repeated three or four times. This *barbotage* terminated, the needle is withdrawn, and the seated patient is made to recline. (The dictionary defines *barboter*, "to dabble, to paddle.") He draws 20 c.c. of the spinal fluid for anæsthesia to the breast if the fluid drips, but takes 25 c.c. if it spurts. For anæsthesia of the head, he draws 25 or 30 c.c. The amount of cocaine for the subumbilical region is 2 c.c.; for the supra-umbilical region, 2·5 c.c. If the patient is very strong he goes up to 3 c.c. For the legs, 1 c.c. is enough. An assistant makes the patient breathe regularly twenty times a minute. During the operation and for two hours thereafter the patient's head is not moved. Another precaution is a subcutaneous injection of scopolamine morphine half an hour before the operation, with an injection of 3 mg. strychnine sulphate and of 5 cg. spartein sulphate. The eyes are then bandaged, and no one speaks during the operation.

Icterohæmorrhagic Spirochætosis (P. Nolf and J. Firket, *Archives Médicales Belges*, April).—Most of the 100 cases at the Hôpital Cabour in Belgium developed during hot weather. The disease was very severe in about 10 per cent.; in some of these the hæmorrhages were alarming. In others the nervous symptoms predominated, or extreme prostration was the main feature. The blood pressure in this latter group was lower than they had ever observed before in any disease with a favourable outcome. They recorded the blood pressure in all the men with this spirochætosis, and regard the extreme hypotony often noted as the cause of the anuria. Others ascribe this anuria to toxic kidney derangement, but signs indicate involvement of the kidneys. There was no visible hæmaturia in any instance, and scarcely any albumin or tube casts in the urine. The low blood pressure entailed the anuria, and this demonstrates the necessity for giving the patient abundant fluids to drink. The physician must pay special attention to this, as with the extreme prostration and the tendency to vomit, the patient is liable not to get enough to drink. The patients had three litres of fluid a day, half in the form of milk. This was supplemented with epinephrine to tide the men past the danger point. They gave to every patient with minimal blood pressure of 6 c.c. mercury, four, six, or even eight doses in the twenty-four hours, each of 0·5 c.c. of the 1 in 1,000 solution. A few patients were unable to drink so much fluid, and they were given subcutaneous injections of an isotonic solution of glucose or an intravenous injection of a 10 or 30 per cent. solution of glucose. The effect seemed to be favourable. Finding spirilla in the urine may be accidental contamination or it may be a question of saprophytes. The fever may return, but the jaundice does not accompany it, nor the severe pains and other symptoms of the original onset, and the fever lasts only four or five or seven days at farthest.

There is analogy between this spirochætosis and yellow fever. These two diseases are of the same type, only that yellow fever is graver. The analogy becomes identity when this spirochætosis is compared with "bilious typhoid" or "Griesinger's disease," another tropical disease. This, too, like the spirochætosis, is not contagious; its small foci are always located close to the mouths of sewers, and it appears in the summer and disappears during the winter.

Field Rats and Plague (L. Otten, *Mededeelingen van den Burg. Geneesk. Dienst*, 1918, No. 6).—Examination of 2,111 field rats showed fleas on 565, and more than half the fleas were of the cheopis species. Field rats get this flea from the house rats, but this species dies off out of doors when inclement weather arrives. The ahalae flea is the regular outdoor flea that infests the field rat the year around. The field rat is susceptible to plague, but is not important in the spread of plague from village to village. The importance of human traffic in the broadest sense of the term in the spread of plague, both short and long distances, is confirmed anew. This finding differs from those previously reported probably because others have left the collections of the field rats and their fleas to the natives. Duration of infectiousness of rat flea lasts for forty-three days. This long protracted infectiousness throws light on the mode of transmission of the plague by means of human traffic.

Abstract.

HÆMOGLOBINURIA (BLACKWATER FEVER).[1]

Observations on a Transient Form occurring amongst the Troops in Macedonia.

By Leonard G. Parsons and J. Graham Forbes, M.A.

Since June, 1916, in a British hospital attached to the Serbian Army, there were forty-six cases of blackwater fever. Of these thirteen occurred in British units. Thirty-eight occurred between October 11, 1917, and March 23, 1918.

Two clearly differentiated types of case were observed: (1) Those associated with polyuria which invariably recovered. (2) Those associated with diminution or suppression of the urine, some proving fatal.

The recognition of the danger of transient hæmoglobinuria is important; a recurrence is very probable, and may develop a severe or even fatal attack.

Symptoms.

In these mild cases the symptoms observed are: nausea or vomiting, shivering, or even a definite rigor, followed by sweating; sometimes pain or a dragging, heavy sensation in the loins; usually some degree of jaundice; the passage of port-wine or porter-coloured urine, which in a few hours becomes normal in appearance.

These symptoms may be slight in degree or moderately severe, but are never as severe as in a sustained case of blackwater fever. They may be no more grave than those accompanying a mild malarial paroxysm, and but for the colour of the urine advice would very likely not be sought in many instances. Indeed, it is quite possible that the condition may be overlooked altogether. For instance, one (No. 1), convalescent from malaria, complained that he had passed black water during the night—a true statement—and also said that he had not had a rigor or feeling of cold, or even headache, backache, or sickness. His temperature had been 99·2° F., and the night nurse reported that he had shivered and afterwards perspired freely. Such an example shows that the general symptoms may be trivial in nature or even absent.

Actual vomiting, also pain in the back and loins, are not common. The jaundice is variable in degree, but never severe, and is of the hæmolytic type. None of these cases have shown more than a moderate grade of fever; the highest temperature recorded was 103·2° F.; as a rule, when the urine cleared, the temperature became afebrile, and remained so unless malarial recurrences occurred during convalescence.

The urine at the onset of an attack varies in colour from a reddish madeira to a deep port-wine shade which, in reflected light, appears almost black.

After being allowed to stand for a short time a light brown sediment is deposited, leaving the supernatant urine clear. The amount of deposit is usually considerably less than in the severer forms of blackwater fever. This appearance rapidly passes off, and after two or three specimens showing hæmoglobin colouration the succeeding urine looks normal to the naked eye.

Thus case No. 2 passed dark "port wine" urine for the first time in the afternoon; the next specimen, obtained during the night, although lighter in colour, still contained hæmoglobin; but the third specimen at 9 a.m. on the following morning was free from hæmoglobin.

The patient already mentioned (No. 1) passed three specimens of madeira-coloured urine between 1 a.m. and 8 a.m.; no more urine was passed until 4 p.m. the same day, and this contained no hæmoglobin.

In the series of cases there has never been any marked diminution in urine passed. In some cases a transient polyuria has been present; thus in the case just quoted 53 oz. were passed between 4 p.m. (the first normal specimen) and 8 a.m. the next morning.

Chemical and microscopical examination of the urine showed a remarkable sequence of changes.

The hæmoglobin, at first giving a very marked reaction, rapidly disappears. The amount of albumin, considerable in the first specimen, rapidly disappears in succeeding ones, but rather less rapidly than the hæmoglobin. Microscopically, the first specimen usually shows numerous casts—granular, hyaline, and epithelial—also many epithelial cells, in addition to a varying amount of granular amorphous debris, and occasionally a few red blood cells. These casts and epithelial cells rapidly disappear from the urine in succeeding specimens. This sequence is so striking a feature of the transient form that, in a case admitted to hospital with a history of having passed black water, the rapid disappearance of casts and albumin from the urine may be taken as confirmatory evidence of recent hæmoglobinuria. Indeed, we are inclined to go further and say that, in this country, this sequence is sufficient to diagnose the occurrence of hæmoglobinuria even in the absence of any history of that symptom.

To explain this series of changes it would seem that the "toxin" of blackwater fever (1) by its action on the red blood cells gives rise to hæmolysis with resulting hæmoglobinæmia and hæmoglobinuria, and (2) by its direct action on the kidney produces necrotic changes in the tubules, followed by the throwing off of epithelial casts.

In addition to the action of the toxin directly on the renal tissues, renal functions are profoundly influenced by the damaging effect of the passage of hæmoglobin and waste corpuscular debris. Both factors are probably responsible for the marked circulatory obstruction evidenced by the extreme capillary congestion. These tubular and congestive changes are well marked in some of the fatal cases

[1] Abstracted from the *Lancet*, September 7, 1918.

of blackwater fever. The throwing off of the cast is the first step in the process of the repair of the kidney lesion.

In the transient cases described, the "dose" of the toxin is a small one; repair begins at once, for casts are very obvious in the first specimen of black water passed. In the severer cases which recover casts are at first seldom seen or are seen only in small numbers; later they increase in number until they reach a maximum, when they may be present in enormous numbers, and then gradually diminish as the case improves, finally disappearing altogether. It is rare to find casts in cases which pass small amounts of urine and eventually prove fatal. The presence of large numbers of casts is therefore of much importance in prognosis.

Details of the urinary changes in three cases of transient hæmoglobinuria are given. No. 3, a Greek doctor, was sent in by a French medical officer as a case of blackwater fever. He had passed black water from noon on the previous day until 10 a.m. on the day of admission. No hæmoglobinuria occurred afterwards, but the urinary changes provided confirmatory evidence of his history.

Urinary Findings in Cases of Transient Hæmoglobinuria.

Associated with hæmoglobinuria and the symptoms already mentioned, the spleen is found to enlarge and not infrequently become tender. In some cases the liver also enlarges, and there may be tenderness over the gall-bladder region. All these signs disappear shortly after the hæmoglobinuria stops.

Convalescence, if not complicated by malarial relapses, is, as a rule, rapid and not much more prolonged than after an attack of malaria. A certain degree of anæmia occurs, but it is not marked. In most of the cases, however, convalescence was retarded by malarial relapses, but without further hæmoglobinuria.

Etiology.

(*a*) *Associated with other Diseases.*—Every case gave a history of repeated attacks of malaria, and many suffered from malarial relapses whilst in hospital.

Some were under treatment for, or convalescent from, malaria at time of onset of hæmoglobinuria. No case of blackwater fever has been seen in association with any other disease, with two possible exceptions, which were at the time under treatment for dysentery and malaria. Examination of the blood for malarial parasites was usually negative. Of the nine cases of this variety of blackwater subtertian parasites were present in one case only; another case showed scanty parasites of uncertain type, probably benign tertian. In the remainder no parasites could be found. One of the negative cases, however, showed hæmozoin pigment in the leucocytes, and benign tertian parasites were found in the blood in a malarial relapse (February, 1918) during convalescence.

(*b*) *Length of Time exposed to Malarial Infection before Hæmoglobinuria occurred.*—Malaria is not a common disease in Serbia, and is of a mild type.

A large proportion of malarial patients admitted to the hospitals attached to the Serbian Army contracted the disease in the summer of 1916, when the re-equipped Serbian Army, recently landed from Corfu, was encamped in the neighbourhood of Salonika. The army took its place in the line early in August, 1916, and at that time there were many cases of malaria. All the transient cases and all except eight of the more severe forms of hæmoglobinuria occurred in the winter of 1917-18, and it may therefore be assumed with a considerable degree of certainty that the Serbian cases had not passed through more than two severe malarial seasons. One of the transient cases occurred amongst the British troops attached to the Serbian Army, and he came out to Macedonia in June, 1917, and was therefore exposed to one malarial season only.

These two facts—namely, that all except eight of the forty-six cases of blackwater fever occurred during the 1917-18 winter and that no transient cases occurred before this winter—justify the opinion (1) that an increase in blackwater fever amongst the troops in Macedonia may be expected in the 1918-19 winter; and (2) that a definite number of cases of transient hæmoglobinuria, precursors of the more severe attacks, have already very probably escaped, and may in the future escape observation. The increase of liability to blackwater fever associated with and, in all probability, favoured by continuous periods of residence in a malarious and blackwater fever country has been frequently noticed, and is now well recognized.

(*c*) *Topography, Weather, &c.*—The cases were derived from one sector of the Serbian Front, which occupies a position in a wide valley leading from the plain up to the mountains where the trenches were situated.

In both plain and valley malaria of a severe type is very rife. The incidence of the disease reaches its maximum during the five or six weeks between the middle of September and the end of October. The incidence curve of blackwater fever, on the other hand, did not begin to rise until October, reached its maximum in February, then fell quickly, and after April and throughout the summer kept very low. Most of the cases occurred during the colder part of the year, and there is no doubt that the condition, as in malaria, may be precipitated and aggravated by exposure to cold and fatigue. The influence of these factors is supported by the well-known effect of cold in producing an attack of hæmoglobinuria in cases of paroxysmal hæmoglobinuria. In many instances cold could certainly not be excluded, because falls of snow and hard frosts were frequent in the trenches during these months. In more than one case, however, this factor could apparently be discounted because the attack occurred in quite warm weather, such as was experienced at times during the winter months of 1917-18, and amongst individuals living in the plain and not in the mountains.

(*To be continued.*)

Original Communication.

THE CLASSIFICATION OF TRYPANOSOMES.

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Preliminary—Genus Trypanosoma—New Classification—Pathogenic Mammalian Trypanosomes—Human Trypanosomes—Conclusion.

Preliminary.—During the last few years I have been engaged with Captain O'Farrell, R.A.M.C., at present a prisoner of war in Turkey, in a study of human and allied trypanosomes as seen in the Anglo-Egyptian Sudan. More recently I have been working in conjunction with Colonel Castellani in the preparation of the third edition of our "Manual of Tropical Medicine." During the investigations necessary for these two series of studies, I have been much impressed with the extraordinary and increasing confusion into which the trypanosomes have been allowed to lapse.

The Knartoum work is not yet sufficiently far advanced for a full consideration of these organisms, but the two pieces of work mentioned above have indicated to me certain lines upon which a classification of trypanosomes might be based, and as this may possibly be of some help by giving a basis for a better and more extended arrangement of these parasites, I venture to bring it forward.

Genus Trypanosoma.—Even the casual reader cannot fail to be impressed with the enormous number of species of very diverse form and different life-history which are included in the genus *Trypanosoma* Gruby 1843.

When we look into the early history of trypanosomes, it is found that the genus was formulated for *Trypanosoma rotatorium* (Mayer 1843) which is found in frogs and is very different from the human trypanosomes. Thanks to the labours of Brumpt it is now known that *T. inopinatum* Ed. and Et. Sergent 1904, also a parasite of frogs, is spread by the leech *Helobdella agira*, in which, according to França, the infective agent is the crithidial form assumed by the trypanosomes during the cycle of development.

It would therefore appear that the term *Trypanosoma* should be restricted to the original meaning, viz., to a trypaniform parasite of relatively large size and slow movement, generally found in the blood of cold-blooded vertebrates and spread by leeches.

If this is admitted, then we have a clearly defined genus *Trypanosoma sensû stricto*, and a very large number of species comprised in an ill-defined genus *Trypanosoma sensû lato*.

The question now arises whether any attempt can be made to break up even a portion of the unwieldy genus *Trypanosoma sensû lato*, in order that a worker may more easily realize what has, and what has not, been done as regards the study of these organisms, and for this purpose a new classification is brought forward.

New Classification.—It would appear that in trypanosomes the definitive and hence primitive host is the invertebrate, and we should expect to find some trypanosomes which were solely denizens of these animals, and apparently this is so. Unfortunately, their full life-history still requires much elucidation, but such forms as *Cystotrypanosoma intestinale* Roubaud, 1911 are worthy of more consideration; and it is obvious that such forms deserve separate classifications, and should form part of a tribe—*Cystotrypanex*, with *Cystotrypanosoma* as type genus and *C. intestinale* as type species.

As evolution proceeds so life-histories tend to become complicated. In this case the complication is the introduction of a vertebrate intermediary host, and with the change in environment one meets with the large, relatively slow-moving trypanosome of the cold-blooded vertebrate and the smaller, quicker-moving trypanosome of the warm-blooded vertebrate. They appear to deserve to be ranked into tribes and to merit more study. The type of the first is obviously Gluge's parasite, and of the second the organism or organisms found by Ford and Dutton in a case of Gambia fever, and by Castellani to be the cause of sleeping sickness.

These various ideas may be crystallized as follows:—

A. Live *only* in a definitive invertebrate host:—
   Tribe 1, *Cystotrypanex*, new name.
   Type genus: *Cystotrypanosoma* Roubaud, 1911.
   Type species: *C. intestinale* Roubaud, 1911.

B. Live in a definitive invertebrate host and in a cold-blooded intermediate vertebrate host:—
   Tribe 2, *Trypanosomex*, new name.
   Type genus: *Trypanosoma* Gruby, 1843.
   Type species: *T. rotatorium* (Mayer, 1843).

C. Live in a definitive invertebrate host and in a warm-blooded intermediate vertebrate host:—
   Tribe 3, *Trypocastellanellex* new name.
   Type genus: *Castellanella* new name.
   Type species: *C. gambiensis* (Dutton, 1902).

These tribes may now be reviewed in the briefest possible manner.

SERIES A: TRYPANOSOMES INFECTING INVERTEBRATA.

Tribe 1: Cystotrypanex.

This tribe has not yet been fully studied, but provisionally it can be classified as follows:—

A. Forms carefully studied:—
   Snout long, no free flagellum. Forms like *T. dimorphon*:—
   (1) Trophonucleus round—*Rhynchoidomonas* Patton, 1910.
   (2) Trophonucleus elongate—*Cystotrypanosoma*, Roubaud, 1911.

B. Forms not yet fully studied:—

The old term *Trypanosoma sensù lato* is retained for these forms, pending further investigation, and they may be divided provisionally into:—

I. Trypanosomes of Hirudinea.
II. Trypanosomes of Arachnida.
III. Trypanosomes of Hexapoda.

SERIES B: TRYPANOSOMES INFECTING COLD-BLOODED VERTEBRATES.

Tribe 2: *Trypanosomeæ.*

At present this tribe contains one genus, viz., *Trypanosoma sensù stricto*, as defined above, and with *T. rotatorium* (Mayer, 1843) as the type.

It is probable that, as constituted, the genus still contains a number of non-defined genera, but these require further investigation, and it is therefore divided into:—

Section I: Trypanosomes of Fish.
Section II: Trypanosomes of Amphibia.
Section III: Trypanosomes of Reptilia.

SERIES C: TRYPANOSOMES INFECTING WARM-BLOODED ANIMALS.

Tribe 3: *Trypocastellanelleæ.*

This tribe may be divided into:—

Section I. Trypanosomes of Aves.—These are but little known and, pending further study, the old genus *Trypanosoma sensù lato* must be retained.

Section II. Trypanosomes of Mammalia.—They may be classified as follows:—

Series (a) *Non-pathogenic Forms.*
(1) Classifiable:—
Genus Lewisonella.
Genus Endotrypanum.
(2) Unclassifiable:—
Old genus *Trypanosoma sensù lato* pending further work.

Series (b) *Pathogenic Forms.*
(1) Classifiable:—
Genus Schizotrypanum.
Genus Castellanella.
Genus Duttonella.
(2) Unclassifiable:—
Old genus Trypanosoma pending more research.
(3) Little known.

Diagnostic Table of Classifiable Forms.

The classifiable mammalian trypanosomes may be recognized by the characters given in the following table:—

A. With schizogony in the vertebrate host—*Schizotrypanum* Chagas, 1909.
B. Without schizogony in the vertebrate host:—
I. Enters red blood corpuscles—*Endotrypanum* Mesnil and Brimont, 1908.
II. Does not enter red blood corpuscles:—
(*a*) Final stage of development in the definitive host is in the hind gut. Infection is contaminative. Aflagellar extremity long drawn out and pointed. Cytoplasm free from granules. *Lewisonella* new name.
(*b*) Final stage of development in the definitive host is in the salivary glands proboscis, or hypopharynx. Infection inoculative:—
(1) Polymorphic, with granular cytoplasm, small kinetonucleus, and well-developed undulating membrane. Final stage in the definitive host takes place in the salivary glands. *Castellanella* new name.
(2) Monomorphic, with non-granular cytoplasm, large kinetonucleus, and with or without well-developed undulating membrane. Final stage of development anterior, but not in the salivary glands. *Duttonella* new name.

The type species of these genera are as follows:—

Schizotrypanum cruzi, Chagas, 1909.

Endotrypanum schaudinni Mesnil and Brimont, 1908.

Lewisonella lewisi (Kent 1879), synonym *Trypanosoma lewisi* Kent, 1879.

Castellanella gambiensis (Dutton 1902), synonym *Trypanosoma gambiense* Dutton 1902.

Duttonella vivax, synonym *Trypanosma vivax* Ziemann, 1905.

Pathogenic Mammalian Species.—The above sketch indicates the main lines of the new classification, but in tropical medicine we are more particularly interested in Pathogenic Mammalian Trypanosomes, and therefore a further analysis of these organisms may be of interest, especially as Bruce and his co-workers have so ably laid a foundation for a classification such as the following.

Bruce has classified pathogenic mammalian trypanosomes into groups as follows:—

A. *Polymorphic trypanosomes* with granular cytoplasm, active movements, well-developed undulating membrane, small kinetonucleus. Spread by tsetse-flies, which are the definitive hosts in which development is completed in the salivary glands. *T. gambiense, T. brucei, T. rhodesiense, T. evansi, T. equiperdum.* (This group corresponds with the genus *Castellanella.*)

B. *Monomorphic trypanosomes* with non-granular cytoplasm. Spread by tsetse-flies, in which development is confined to the proboscis and hypopharynx. (This group agrees with the genus *Duttonella.*)

I. Kinetonucleus large and terminal. Undulating membrane poorly developed and simple. Movements very rapid. *T. vivax*, *T. capræ*, *T. uniforme*. (Vivax sub-group.)

II. Kinetonucleus prominent and subterminal. Undulating membrane well developed. Movements active. *T. pecorum* and *T. simiæ*. (Pecorum subgroup.)

Taking into consideration the above, we may arrange the pathogenic mammalian trypanosomes as follows:—

Classifiable.

Genus *Castellanella*. New name.

Definition.—Trypocastellanelleæ with the definitive host a fly and the intermediate host a warm-blooded vertebrate. Without reproduction by schizogony in the vertebrate host, in which it is polymorphic, with granular cytoplasm, small kinetonucleus, and well-developed undulating membrane. Final stage in the definitive host is in the salivary glands. Infection (from fly to man) is inoculative and transmission (from man to fly) is ingestive.

Type species.—*Castellanella gambiensis* (Dutton 1902).

Other species.—The other species of the genus may be differentiated as follows:—

A. *Posteriorly nucleate in rats*:—
  I. Will not infect man. Kills an animal immunized against C. rhodesiensis—*C. brucei*.
  II. Infects man. Kills an animal immunized against C. brucei—*C. rhodesiensis*.
B. *Not posteriorly nucleate in rats*:—
  I. Infection only known to proceed direct from intermediate vertebrate host to intermediate vertebrate host during coitus—*C. equiperdum*.
  II. Infection by means of a definitive host:—
    (*a*) Definitive host not a tsetse-fly—*C. evansi*.
    (*b*) Definitive host a tsetse-fly:—
      (1) Causes chronic and often mild infection in man—*C. gambiensis*.
      (2) Causes acute and severe infections in man—*C. castellanii*.

Genus *Duttonella*. New name.

Definition.—Trypocastellanelleæ with definitive host in a fly and intermediate host in a warm-blooded vertebrate. Without reproduction by schizogony in the vertebrate host, in which it is monomorphic. With non-granular cytoplasm, a large kinetonucleus, which may be terminal or subterminal, with or without a well-developed undulating membrane. Movements active. Final stage in the definitive host is confined to the proboscis and hypopharynx.

(*a*) Kinetonucleus large and terminal. Undulating membrane poorly developed and simple. Invertebrate host a glossina:—
  (1) Rats refractory—*Uniformis*.
  (2) Rats susceptible—*Vivax*.
  (3) Only equidæ and ruminants susceptible—*Capræ*.
(*b*) Kinetonucleus prominent and subterminal. Undulating membrane well developed:—
  (1) Small, 8-18 microns; found in cattle—*Pecorum*.
  (2) Larger, 14-24 microns; found in monkeys—*Simiæ*.

Unclassifiable.

Genus *Trypanosoma sensù lato*.

Group 1. Part of the flagellum always free.
Group 2. No part of the flagellum free.
Group 3. Little-known forms.

Human Trypanosomes.—Among the Pathogenic Mammalian Trypanosomes those of man are of the greatest interest and importance to the student of tropical medicine, and therefore no excuse is required for a more detailed consideration of those known to occur in man, which are:—

(1) *Trypanosoma gambiense* Dutton, 1902.
(2) *Trypanosoma castellanii* Kruse, 1903.
(3) *Trypanosoma vivax* Ziemann, 1905, or a variety thereof.
(4) *Trypanosoma cruzi* Chagas, 1909.
(5) *Trypanosoma rhodesiense* Stephens and Fantham, 1910.
(6) *Trypanosoma nigeriense* Maefie, 1913.
(7) *Trypanosoma gambiense* varietas *longum* Da Costa, Sant'Anna, Dos Santos, and Alvares, 1915.

When a classification is desired it is always necessary to attempt to discover the character of the original species, which in this case is *T. gambiense* Dutton, 1902. Sixteen years have passed since the slides containing the original specimens of Dutton and of Todd were made, and, therefore, as the original strain has long been lost, one of the simplest methods of comparing other organisms with the original specimens is morphological. Chalmers and O'Farrell have made this comparison by measuring one thousand non-dividing forms in the original slides. As far as measurements go, these strains are very similar, but morphology often may not help in separating closely related but perhaps quite distinct species, which require to be studied serologically and with regard to animal pathogenicity, and, in cases of human infection, with regard to the nature of the disease in man. Thus Stephens has pointed out that *T. lewisi* and *T. rabinowitschi*, *T. brucei* and *T. evansi*, *T. pecaudi* and *T. ugandæ*, *T. rhodesiense* and *T. pecaudi* are indistinguishable morphologically, but are distinct biologically.

These points are mentioned in order to make clear to the reader the necessity of comparing

human trypanosomes by means of the clinical features of the disease in man, in addition to the serum reactions and animal experiments, as well as by morphological characters, and on these grounds the old name *T. gambiense* undoubtedly covered a number of different forms, a fact which at the present time is generally admitted with regard to *T. rhodesiense*. And why not? Are there not a number of different trypanosomes in wild animals in Africa, and is it impossible that man should from time to time become infected by one of these, even if it does not appear in epidemic form in the human race? To exemplify, attention may be drawn to an organism resembling *T. vivax* found by Macfie in man.

Extending these observations further, it appears that *T. gambiense* is associated with a milder form of sleeping sickness, and is essentially endemic in North West Africa, while *T. castellanii* is the cause of a more virulent disease seen in Uganda and Equatorial Africa. Indeed, many authors have already noted this clinical difference.

Sir David Bruce believes that *T. rhodesiense* Stephens and Fantham, 1910, is the same as *T. brucei* Plimmer and Bradford, 1899, but this can hardly be so, because Laveran and Nattan-Larrier have immunized a ram against *T. brucei*, and then infected it with *T. rhodesiense*, an acutely lethal infection ensuing. The serological experiments of Chalmers and O'Farrell *in vitro* and *in vivo* also show the same marked differences between *T. rhodesiense* and another posteriorly nucleate trypanosome in the Sudan. These experiments are more important than measurements, and more important than finding that the development in *Glossina morsitans* is very similar in both variants. *T. rhodesiense* may have been derived in recent times from *T. brucei*, but its altered environment in man has changed its physiological characters. As the fly remains the same, one would expect this portion of the life-cycle to be similar in the two trypanosomes.

T. nigeriense and *T. gambiense* var. *longum* are *T. gambiense*, because, apart from the morphological similarity, to which importance is not assigned, their pathological action in man and the lower animals appears to be identical.

As a result of these considerations, and changing the names so as to agree with the new nomenclature, the following parasites of man may be recognized:—

A. *Belonging to the genus Castellanella*:—
  (1) *Castellanella gambiensis* (Dutton, 1902).
  (2) *Castellanella castellanii* (Kruse, 1903).
  (3) *Castellanella rhodesiensis* (Stephens and Fantham, 1910).

B. *Belonging to the genus Duttonella*:—
  (4) *Duttonella vivax* (Ziemann, 1905), or a variety thereof.

C. *Belonging to the genus Schizotrypanum*:—
  (5) *Schizotrypanum cruzi* Chagas, 1909.

These five species may be differentiated as follows:—

A. With schizogony—*S. cruzi*.
B. Without schizogony:—
  I. Monomorphic—*D. vivax*.
  II. Polymorphic:—
    (*a*) Posteriorly nucleate—*C. rhodesiensis*.
    (*b*) Not posteriorly nucleate:—
      (1) Animal infections chronic and comparatively mild. North-West Africa —*C. gambiensis*.
      (2) Animal infections severe. Equatorial Africa—*C. castellanii*.

Conclusion.—It may be said that the time is not ripe for an attempt to classify trypanosomes, but someone must make a beginning, and without doubt Professor Minchin would have formulated a classification had he lived. The above arrangement is intended to show what is known and what is not known at the present time, with the view of facilitating future work.

Treatment of Malaria and other Protozoan Diseases (T. Pontano, *Policlinico*, June 9).—After a year's experience at a hospital in Rome to which soldiers are sent returning with malaria from Macedonia, about 11 per cent. proved impossible to cure by the usual method—that is, by giving 2 grm. of quinine by the mouth daily for three weeks, with intermissions of four or five days between the weeks. Various reasons interfered with the systematic preventive use of quinine when the troops were in Macedonia. The men were supposed to be taking 0·60 grm. of quinine daily between April and November, but many did not get this systematic prophylaxis all the time. One reason for the non-taking or the non-absorption of the drug was the epidemic of dysentery which preceded, by a month, the outbreak of the malaria epidemic in each of the two years of the campaign. The malaria parasites and protozoa in general are liable to become resistant to a specific drug given constantly by one route. Even increasing the dose many fold gives no better results. But by changing the mode of administration the drug then is able to act on the parasites with its pristine force. It is possible that the molecular composition of the drug becomes altered as it enters the organism by another route. A few small doses by subcutaneous or intramuscular injection may speedily conquer the malaria when it had proved refractory even to large doses long continued by the mouth. The same principle probably applies to all protozoan diseases. They may succumb to the same drug when its molecular composition has been modified by changing to another method of introduction.

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NOVEMBER 15, 1918.

INFLUENZA.

PART PLAYED BY ALCOHOL IN ITS TREATMENT.

THE prevalence of this scourge is so serious that it is interesting to review some of the episodes in the history of the disease. Our clinical knowledge of influenza dates from the 1847 epidemic, when Dr. Peacock gave a categorical account of the prevalent types, dividing them into (1) The Simple Catarrhal Fever; (2) The Epidemic Catarrhal Fever, with Predominant Pulmonary Affection; and (3) Catarrhal Fever complicated with Gastro-intestinal Affections and Rheumatism and of a Remittent Character. Yet another grouping of symptoms by Dr. Dawson Williams—based upon the 1889-92 epidemic—gave us the Catarrhal, the Gastric, and the Nervous. The present epidemic may produce a further classification in which the pulmonary type of the disease will no doubt take the foremost place. The word Influenza is adopted from the Italian word meaning Influence, and so far as our knowledge goes, the legend, "The Influence," meets the occasion, for we have no definite bacteriological factor to explain either the epidemiology or the signs and symptoms of the ailment. Many "germs" have been found, but none so far are held to be "specific." The fatality of the present outbreak is beyond the experience of anyone living, so appalling is the mortality that the disease is looked upon with dread.

It is doubtful if anyone escapes "the Influence" in some form or other; and although no doubt we may fall into the usual error, which obtains during all epidemics, of putting down concomitant ailments of the usual everyday type to the prevailing epidemic, it would seem as if the nature of the ailment "influences" us all physically, now in one way, now in another. As there is, moreover, scarcely an organ of the body which has not been described as being attacked by influenza, it is only natural for us to lay the blame upon it for ailments which arise from other and more everyday causes.

A question arises: Are we ever free from influenza? When a "cold" runs through a household, what is the explanation of the phenomenon? Because a member of the household, after getting "wet feet," or putting on damp clothing, or, in any one of the many ways we know of, contracts a "cold," why should the "cold" thus produced run through the household? How often do we find that when one particular member of the household develops a cold, the others say "We'll all get it now," because when he or she is attacked we are sure all to catch it. It will usually be found it is one of the older members of the household that is thus accused; one who has probably had influenza during a previous epidemic, and from our knowledge acquired within the last few years of other ailments, typhoid especially, remains a potent "carrier" of the infection, for, it may be, all his or her life.

The writer in December, 1888, read a paper before the Hong Kong Medical Society, in which he gave a description of an ailment with which he was not familiar, and asked the members to name the ailment. The matter fell into abeyance, as those present did not recognize that the ailment was anything out of the way or worthy of notice. The writer sent the paper to the *British Medical Journal*,

in which it appeared in 1891 under the title of (and styled so by the editor, not by the writer), "The first recorded Cases of Influenza in the Modern Epidemic." It will be remembered that the epidemic spread round the world, starting from China, and when it reached Siberia, and hence to Russia in Europe, it was styled "Chinese influenza." When it appeared in Western Europe it was called "Russian influenza." It was further brought to the eastern seaports of America by British ships, and after travelling across America it reached Japan, where it was called "American influenza." From Japan it reached China again, and started a second, a third, and a fourth time round the world, following the pathway from East to West fairly systematically.

In the well-known Australian writer's account of the epidemic he focuses the starting-point in Hong Kong, and in the map given the pathway shows this definitely. Curiously enough, neither the members of the military nor of the civil medical services in Hong Kong would have it that the disease mentioned by the writer in 1889 was influenza. So persisteutly was this adhered to that a member of the Civil Medical Staff wrote to the *British Medical Journal* saying that the writer's account was "nonsense," and in the official records of the military and civil services it was specially notified during 1889-91 that no influenza was present in Hong Kong, which "officially" remained the only spot of the globe in fact where influenza was unknown. In the birthplace of the disease it was "officially" denied to prevail. "The disease," like a prophet without honour, had no "recognition" in its own country.

The serious form which prevails at present is often termed "Spanish influenza," for from Spain it was first heard of in Europe. There seems no East to West pathway in this, the most recent outbreak, and it would seem to appear in all the five continents of the world pretty well simultaneously. If so, then is influenza, like no other disease, known to mankind. The "lines of communication" theory will not explain this phenomenon of "simultaneous" appearance in widely separated countries. Is there a common factor of infection? If so, what is it? Can anything but the atmosphere be the channel of transmission? In other words, are we brought back to the name assigned to the disease in Northern Italy in 1742—namely, "the Influence," and be content to rest therewith? It is a humiliating fact to have to do so in view of modern scientific achievement in other spheres.

The cause of the serious death-rate of persons attacked has yet to be found. If influenza is a germ-borne disease, and due, therefore, to a specific organism, what has caused its effects to be so terrible compared with previous outbreaks? What is present in the world to-day that did not exist during previous epidemics? In the first place, owing to the War, food is scarce in almost every country in the world; the people are therefore less fit to combat the inroads of influenza, which is, above everything, a disease of depression. It may be said that the disease broke out in Spain, which was not at war, and therefore the food supply being deficient could not be the guilty factor. Judging by the food riots in Spain, this objection cannot hold, for in Spain, as in other countries, such as Switzerland, Denmark, &c., not at war, the people suffered from scarcity of food in an extreme measure. Another item is the absense of alcohol. In the treatment of influenza alcohol is *the* drug *par excellence*. Without it we are deprived of the sheet-anchor of our treatment. Other drugs are mere accessories, and but poor accessories at best. It is not the fashion to acclaim the virtues of alcohol at the present day; yet it was brought into the world not for its demoniacal influence, but as an element of usefulness. Man has made it, as he has made many other of Nature's gifts, a thing of evil, and he has paid the penalty. But its entire absence has its penalties also, and in no more glaring instance than at present. It is difficult to get owing to absolute scarcity, and also owing to its price; and yet another factor betrays itself—namely, unfounded prejudice and "fashion." Fashion in dress is not the only phase of this many-sided question; we have many fashions, some good, some evil, and it is for medical men to lay aside cant, and refuse to see their patients die because the dictates of a foolish fashion is hampering and weakening their armamentarium in the treatment of influenza.

He who expresses doubt about the potency of alcohol, and especially of spirits in influenza, is either inexperienced or blinded by fashion and guilty of throwing aside the most potent of our drugs. The patient has to be carefully shepherded through the depressing influences of influenza, and than alcohol we have no better drug.

J. C.

Abstract.

HÆMOGLOBINURIA (BLACKWATER FEVER).[1]

OBSERVATIONS ON A TRANSIENT FORM OCCURRING AMONGST THE TROOPS IN MACEDONIA.

By LEONARD G. PARSONS and J. GRAHAM FORBES, M.A.

(*Continued from p.* 220.)

(*d*) *Presence of a Specific Hæmolysin, &c.*—A certain number of experiments have been carried out by one of us (L. G. P.) to determine, if possible, the presence of a specific hæmolysin.

The difficulties in demonstrating a specific lysin are great; it is highly probable that by the time

[1] Abstracted from the *Lancet*, September 7, 1918.

the hæmoglobin appears in the urine the lysin has done its work and disappeared from the blood. This would seem to be so particularly in the transient forms of hæmoglobinuria, and even in those cases which show a naked-eye hæmoglobinæmia at the time of the experiment the same may be true. Hæmolysis is, of course, taking place coincidently with the rigor, vomiting, and raised temperature; and if the serum were taken at this early period better results might be obtained; these symptoms, however, frequently occur before the patient comes into hospital or are thought to be the onset of an ordinary malarial attack. Up to the present we have not been successful in obtaining blood serum in the initial stage of an attack, and we have not obtained any evidence of a specific lysin.

The sera have been tested against the washed red blood cells of individuals in hospital for other conditions than blackwater fever, and control experiments have also been done by putting sera of normal individuals up against the washed red blood cells from cases of blackwater fever.

As a rule a 10 per cent. dilution of sera and 10 per cent. dilution of red cells were used, but in a few cases undiluted sera were also tried against a 10 per cent. dilution of red cells. The hæmolytic tubes containing sera and cells were put into the incubator at 37° C. for one hour, being shaken about every ten minutes; afterwards they stood outside the incubator for twelve hours. As we had no ice-chest this was timed so that the tubes were outside the incubator all night, for the nights were frosty. The sera of blackwater fever patients were also tested against the citrated blood of these normal individuals in order to see if agglutination of the red cells took place. Sufficient serum and cells for these tests can be obtained from 1 c.c. of blood: this amount of blood can be easily removed from the patient's vein with a hypodermic syringe and needle without doing the least harm to the worst case of blackwater fever.

The sera of five of the transient cases were tested in this manner.

In two cases only was there even the slightest degree of hæmolysis, and in each of these the tinge of hæmolysis occurred with one group of normal cells only. It is perhaps noteworthy that these two blackwater sera showed marked agglutination of the red cells when tested against the citrated blood from which this group of cells was obtained.

Marked agglutination occurred in some of the other experiments, but no hæmolysis.

A rather interesting result was obtained in another case. The point has probably been already observed, but it throws a little light on the changes occurring in blackwater fever. The specimen of urine passed by the patient (No. 1) before the blood was taken contained hæmoglobin; the next specimen passed some hours later was free from hæmoglobin, but the blood serum showed most definite tinting with hæmoglobin (hæmoglobinæmia). The hæmoglobin free in the blood-stream had probably been dealt with by the liver, and it was noted subsequently that the stools apparently contained an excess of bile pigment.

The fragility of the red cells in some of these cases was tested against varying percentages of saline and found to be normal. It is universally agreed, we believe, that the "fault" in blackwater fever does not lie with the red cells.

(*e*) *Relation between Quinine and Hæmoglobinuria.*—We have formed the opinion that quinine is not *the* cause of hæmoglobinuria.

We have seen cases where quinine had not been taken for weeks previous to the appearance of blackwater fever. Patients have been given quinine during the attack and no untoward results have occurred; moreover, several of the cases have shown typical malarial attacks during convalescence and have been treated with quinine in doses up to 70 gr. per diem without a return of blackwater. Outside our own experience, however, there would appear to be some evidence that quinine may in very rare instances act as the determining agent in precipitating an attack of blackwater fever comparable, as already suggested, to the effect of exposure to cold, over-exertion, and fatigue. We are of opinion, however, that the possible existence of such cases should not influence treatment, for, even if they do exist, they are extremely rare.

We tried the effect of adding red blood cells from cases of blackwater fever to solutions of common salts in strengths of 0·05 to 0·9 per cent., in each of which was dissolved quinine bihydrochloride in strengths which we estimated would represent the concentration of quinine in the blood when administered by the intravenous method in doses of 10 to 15 gr. It was found that in some cases hæmolysis did not occur with strengths above 0·3 per cent. —i.e., the normal limit, but in other cases hæmolysis occurred with all strengths up to 0·9 per cent. It was therefore thought possible to separate out two classes of blackwater fever—namely, those in which quinine could be given, and those in which its action would be harmful, and that in this way the test would prove an important guide to treatment. Later, however, we obtained similar results in patients not suffering from blackwater and actually taking quinine at the time. It was also found that in cases of hæmoglobinuria whose red cells showed hæmolysis in all strengths of the solution, the quinine given caused no increase in the amount of hæmoglobinuria, and that after an attack had passed off subsequent administration of the drug did not produce a recurrence.

The true causal factor of the blackwater fever attack must be looked for in connection with the toxins of the malarial parasite.

Certain work has been done on the malarial toxins, but there still remains a considerable field for research into their nature. The suggestion that the hæmolysis is due to supersensitization of the red blood cells does not, in our opinion, give a satisfactory explanation of the fatty degeneration of the myocardium and the necrotic changes found in the liver and spleen in fatal cases. Nor does

this theory explain the very marked degenerative and tubal changes or the extreme congestive disturbances which occur in the kidney in such cases. We consider the uræmia and anuria are due to these renal changes rather than, as is usually held, to the mechanical effect of the blocking of the tubules with hæmoglobin.

Further, these changes much resemble those found in other severe toxic conditions—e.g., eclampsia—and afford strong presumptive evidence of the presence of a toxin in the blood. This toxin apparently differs from the ordinary malarial toxin, since in deaths from malaria the spleen, liver, and particularly the kidneys, do not show the striking changes seen in blackwater fever. Certain facts appear to point to this special toxin being elaborated in the intervals between malarial attacks, for hæmoglobinuria frequently occurs unaccompanied by any actual malarial paroxysm.

Treatment.

All our patients were treated at the commencement of their illness as if suffering from severe blackwater fever, but when it was seen that the case was a transient one treatment was modified accordingly.

Warmth, absolute rest in bed, administration of a saline aperient, and copious drinks of lemon water, barley water, soda water, &c., were ordered. The only food allowed was milk, and patients were encouraged to take at least five pints of fluid in the twenty hours; some, indeed, drank as much as eight pints in that period. Some of the cases received rectal salines, 5 oz. of normal saline being given every two hours, or 10 oz. every four hours. These were, however, stopped in the course of a few hours when it became obvious that the case was a transient one.

At the end of forty-eight hours the strict milk dietary was relaxed, and milk pudding, bread-and-milk, jelly, &c., were allowed. The diet was further increased *pari passu* with the improvement in the urinary symptoms, which usually cleared up so rapidly that the patient soon reached a full diet.

Quinine was given, not as a routine measure, but only if evidence of active malarial infection was shown, either by finding parasites in the blood or by the development of malarial symptoms following on, or in addition to, the hæmoglobinuria.

When quinine is necessary it is, perhaps, best administered intramuscularly, but it has also been given by the mouth or, occasionally, by the rectum, 5 gr. being added to each rectal saline. Quinine sulphate has been given by the mouth and the bihydrochloride by the two other methods.

Quinine amblyopia is stated to be more common in blackwater fever than in malaria, and therefore it has been recommended that great care be taken in determining the dosage of quinine in this disease; whilst not disputing this point, we think that some of the visual symptoms may have been due to retinal hæmorrhages, such as have been observed in certain of our cases by our colleague, Captain W. Niccol, R.A.M.C., ophthalmic specialist to the hospital. During the hæmoglobinuria we have not given more than 45 gr. in the twenty-four hours, but in the relapses of convalescence we have given 60 gr. daily, and in one case of a severe relapse 70 gr. a day were given on two successive days.

During convalescence a generous diet was ordered and iron and arsenic given.

Convalescent treatment was continued for a longer period than for an ordinary malarial attack. The period of absolute rest in bed should be about ten days; some of our cases, however, were up before that length of time had expired, because it is almost impossible to keep a Serb patient in bed when he is feeling anything approaching well.

As previously stated, malarial relapses occurred during convalescence in nearly all the cases and were treated as ordinary malarial attacks.

A careful watch should be kept on the urine during these relapses on account of the possible recurrence of hæmoglobinuria. All cases after recovery from an attack should be removed from a blackwater fever area, and, if possible, evacuated from Macedonia owing to the risk of recurring and more severe attacks of blackwater fever.

Prognosis.

The prognosis of the actual attack of transient hæmoglobinuria is invariably good; indeed, the symptoms may be quite trivial, and most cases would recover even if no treatment were received. The outlook, however, may be grave in a patient already seriously debilitated by previous malaria or dysentery. In the only case in our series which gave us any anxiety there was marked debility from recent malaria and dysentery at the time the hæmoglobinuria occurred; after three days, however, the patient made a rapid improvement and was soon out of danger.

As for their future prognosis, these cases are liable to recurrences of hæmoglobinuria, especially if they remain exposed to malarial infection. Moreover, in all probability these recurrences will prove more severe than the original attack. Judging from the cases we have seen, no permanent damage is done to the kidneys by these transient attacks.

Conclusions.

This paper has been written to draw particular attention to these cases of transient hæmoglobinuria for the following reasons:—

(1) The condition is frequently a slight one and may escape notice unless looked for; but apart from its mild character it is in all respects the same disease as blackwater fever, and should so be regarded. All varieties, including intermediate cases between the transient and the severe and fatal forms of blackwater fever, have been seen.

(2) Transient hæmoglobinuria is very likely to be the precursor of more severe recurrences.

(3) It is highly probable that the transient cases and all other forms of blackwater fever will be more common among the troops in Macedonia during the winter months of 1918-19 than in previous years.

Original Communication.

ENTERICA IN THE SUDAN.

By Major R. G. ARCHIBALD, M.B., D.S.O., R.A.M.C.

Pathologist, Wellcome Tropical Research Laboratories, Khartoum.

IN the Fourth Report [1] of the laboratories attention was called to the existence in the Sudan of enteric-like fevers which, on investigation, proved to be clearly different from either true typhoid or paratyphoid.

Unfortunately facilities for carrying out extended investigations on these fevers have not always been forthcoming, medical officers in charge of such fever cases resting content either with a diagnosis based on clinical data alone or on the results of agglutination tests, consequently many of the pyrexias of the enterica group still remain to be worked out and classified.

That clinical data and the results of agglutination tests may prove misleading for accurate bacteriological diagnosis will be apparent from recent investigations embodied in this paper. In the early stages of enterica infections diagnosis is often doubtful and difficult, more especially in the Tropics, where the clinical manifestations met with are found to be common to many febrile conditions, particularly those associated with amœbiasis, helminthiasis, hepatitis, *B. coli* infections, &c., while past experience in the Sudan has shown that agglutination tests even in a population unprotected by preventive inoculation fall far short of providing an accurate diagnosis as to the causal agent of the disease concerned.

It is not uncommon in these laboratories to return negative agglutination results for cases clinically of the enterica group, and, on the other hand, to obtain positive findings from cases which clinically do not come under such a category.

These paradoxical results led to the assumption that some of the so-called enterica infections were probably caused by organisms differing from, but allied to, the typhoid-paratyphoid group, and, to substantiate such a view, it was decided to adopt the procedure of blood culture wherever possible on all such cases.

The results recorded in this paper represent the findings in some eight cases of enterica that occurred in the Sudan during the last twelve months.

Technique of Blood Culture.—To be certain of success this was usually carried out within the first ten days of the illness, but a later period did not preclude the possibility of there still being an existing bacillæmia, more especially if the blood be removed in the late afternoon or evening, when there is usually some pyrexia. If attention be paid to this latter detail there would be a greater percentage of positive results by blood culture.

The methods of sterilization of the skin consisted of a preliminary rubbing of the epidermis with ether, followed by two applications of tincture of iodine at five minutes interval. Blood not less than 7 c.c. in amount was removed by means of a sterile syringe and inoculated into suitable media. If it was not possible to carry out blood culture before the tenth day of illness, a larger quantity of blood, 7 c.c. to 12 c.c., was removed.

Culture Media.—Flasks containing Coleman and Bunton's medium were previously employed, but were eventually discarded in favour of a 2 per cent. solution of sodium taurocholate in distilled water; this latter culture medium was recommended to the writer by Lieutenant-Colonel Dudgeon, R.A.M.C., and proved a success in the laboratories connected with the Dardanelles expedition. Large test tubes containing 15 c.c. of this medium were inoculated with the above-mentioned quantities of blood and thoroughly shaken, and then incubated at 37° C.

After twenty-four to forty-eight hours subcultures were prepared on Endo's or MacConkey's media, and discrete colonies picked off and their further cultural characters worked out.

Clinical Features of the Fevers.—Briefly stated, the signs and symptoms of enterica were common to all, the cases being usually admitted to hospital with pyrexia, headache, constipation, or, more commonly, diarrhœa, furred tongue, slow, but not always, dicrotic pulse, and the abdomen was either tumid or more often "doughy." The latter was a characteristic sign. Splenic enlargement was an uncommon feature, as was also the presence of any rash. In some instances the fevers were very toxic in type, mental hebetude or restlessness being marked signs; they usually terminated in two to three weeks, followed by a prolonged convalescence in which tachycardia and cardiac dilatation were fairly constant, more especially among Egyptians.

Case 1.—Egyptian boy, aged 12.

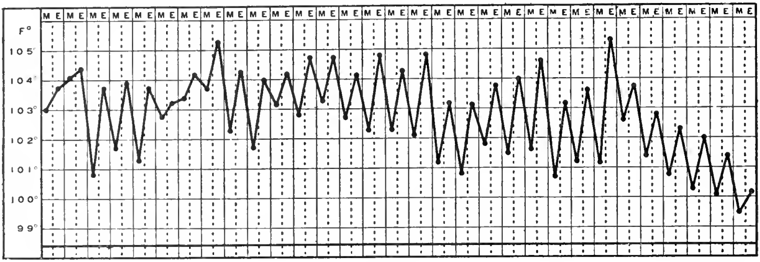
Illness commenced with rigors and bilious vomiting and constipation, followed by splenic enlargement, diarrhœa, and nervous manifestations in the second week of the disease.

Characters of the Organism isolated.

Morphology.—A Gram-negative short motile bacillus, measuring on an average 1·5 microns in length by 0·5 micron in breadth, showing no polar staining. A few filamentous forms were noted.

Biochemical Reactions.—These were tested quantitatively by means of $\frac{N}{20}$ KOH, phenolphthalein being used as an indicator, and uninoculated sugars and alcohols serving as controls. The tests were carried out after forty-eight hours' incubation at 37° C. The organism produced acid, but no gas in the following carbohydrate and alcohol media: Glucose, lævulose, galactose, maltose, lactose, dextrin, adonitol, and mannitol, while neither acid nor gas occurred in rhamnose, saccharose, raffinose, salicin, inulin, starch, glycerol, erythrol, dulcitol, and sorbitol.

Serum Reactions.—The patient's serum completely agglutinated the bacillus isolated from his



CASE 1.

blood in dilutions up to 1:100 in one hour, but failed to agglutinate the laboratory stock strain of *B. typhosus* in 1:30 and 1:60, and also *paratyphosus* A and B.

Specific *B. typhosus* serum (titre 1:2000 to 1:8000) gave a partial agglutination in 1:2000, but in no higher dilutions. No agglutination occurred with specific *B. paratyphosus* A and B sera.

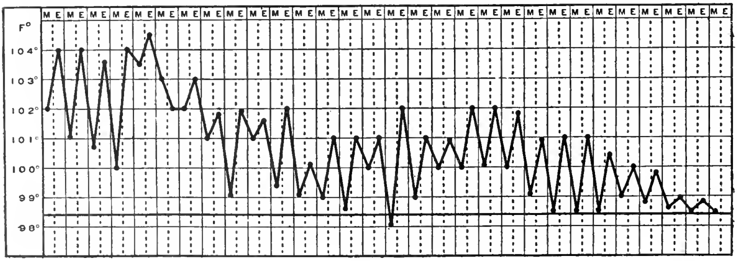
Case 2.—An Egyptian soldier admitted to hospital on the sixth day of his illness, complaining of headache, pyrexia, and pain and tenderness over McBurney's area. The tongue was furred, the spleen enlarged, and the abdomen doughy on palpation. No malarial parasites were present in the peripheral blood, but an increase of large mononuclear leucocytes and lymphocytes was noted. Constipation was present throughout the illness.

showing no polar staining. Young cultures on agar also showed filamentous forms.

Biological Characters.—Grew best aerobically at 37° C., and was capable of growth at 22° C. and 40° C., and was also a facultative anaerobe.

Cultural Characters.—On *agar* the growth resembled that of *B. typhosus*. In *broth* a general turbidity was produced without a pellicle. *Gelatine* was not liquefied. *Litmus milk* was rapidly acidified without the formation of a clot. On the eighth day the reaction was changed to a permanent alkalinity. On *potato* a moist, white, viscid growth was formed. This organism reduced *nitrates* to *nitrites*, but did not produce *indol*, and failed to give a positive *Voges Proskauer* reaction.

Biochemical Reactions.—Acid but no gas was produced in glucose, lævulose, galactose, maltose,



CASE 2.

Blood culture was carried out on the eighth day of the disease. The day following the patient developed a lobar pneumonia with blood-tinged expectoration.

Blood culture yielded a Gram-negative motile bacillus 1·6 microns long and 0·5 micron broad

lactose, raffinose, salicin, glycerol, and mannitol, while neither acid nor gas occurred in rhamnose, saccharose, dextrin, inulin, starch, erythrol, adonitol, dulcitol, or sorbitol.

Serum Reactions.—The patient's serum taken at the end of the third week of the illness agglutinated

this bacillus up to a dilution of 1:60, but failed to agglutinate *B. typhosus* in dilutions of 1:40 and 1:60.

Specific typhoid serum with a titre of 1:2000 to 1:8000 completely agglutinated this bacillus in a dilution of 1:4000, but no agglutination occurred in higher dilutions.

Specific *paratyphoid* A and B sera failed to agglutinate this bacillus.

Case 3.—An Egyptian soldier admitted to hospital with pyrexia, headache, and diarrhœa. On the eighth day of the disease patient was in a very toxic state and showed considerable mental hebetude. The abdomen was tumid and the tongue dry and furred. There was no rash and no splenic enlargement. On the ninth day the patient had a severe intestinal hæmorrhage from which he recovered.

Blood culture carried out on the fifth day of the illness yielded a Gram-negative motile bacillus measuring 1·4 to 1·7 microns in length and about 0·4 micron in breadth. The bacillus possessed rounded ends with four terminal flagella, but showed no polar staining.

Biological Characters.—The bacillus grew well at 37° C. and at 22° C. and 40° C. It was also a facultative anaerobe.

Cultural Characters.—On *agar-agar* the growth resembled that of *B. typhosus*. In broth there was a slight turbidity, but no pellicle formation. *Gelatin* was not liquefied. On *potato* a white, glistening, but not luxuriant growth occurred, and blood serum was not liquefied by this organism. In *litmus milk* acidity, but no clot was produced, the medium remaining acid at the end of twenty-one days.

The organism reduced *nitrates* and *neutral red*, and gave a negative *indol* and *Voges Proskauer* reaction.

Biochemical Reactions.—It formed acid and gas in glucose, galactose, rhamnose, dextrin, starch, mannitol, and sorbitol, and acid only in lævulose, maltose, lactose, and dulcitol, and produced neither acid nor gas in saccharose, raffinose, inulin, salicin, glycerol, erythrol, and adonitol.

Serum Reactions.—Patient's serum in the early stages of the illness showed little or no agglutinating properties for his own organism, but at the end of convalescence his serum completely agglutinated it in dilutions of 1:20 and 1:60, and gave a partial agglutination in 1:120.

With *B. typhosus* and *B. paratyphosus* A no agglutination occurred, and only a partial agglutination occurred in 1:60 with *B. paratyphosus* B.

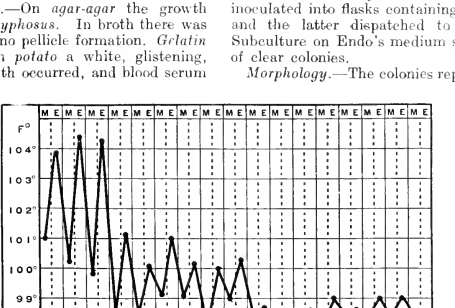
As the organism appeared to be closely related to the Paratyphoid Gaertner group, specific sera tests were carried out. *Paratyphoid* A and *paratyphoid* B sera failed to agglutinate this organism even in low dilutions, and a similar negative result was obtained with specific *B. gaertner*. Specific *B. typhosus* serum also failed to agglutinate it.

Case 4.—Was a European resident in Port Sudan, and was admitted to hospital with headache, pyrexia, and enlarged and tender spleen and a slight dry cough. Six days after admission a roseolar rash appeared on the chest and abdomen, and during this period patient had numerous sweats and rigors. Quinine treatment failed to influence the pyrexia, and blood culture was then carried out about the ninth day of the illness, the blood being inoculated into flasks containing taurocholate media and the latter dispatched to these laboratories. Subculture on Endo's medium showed the presence of clear colonies.

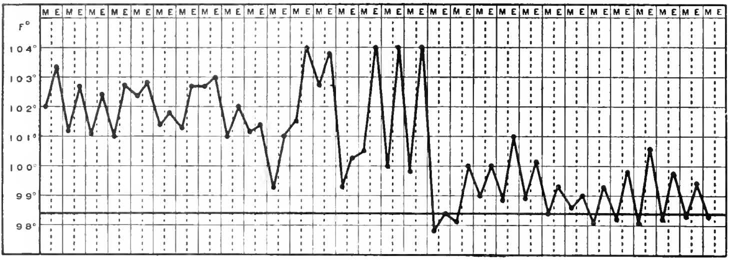
Morphology.—The colonies represented an actively motile Gram-negative bacillus about 1·5 microns in length showing no polar staining.

Biological Characters.—The bacillus grew well aerobically at 37° C. and also at 22° C. and 40° C., and was also a capable anaerobe.

Cultural Characters.—On *agar-agar* the growth resembled that of *B. typhosus*. In *broth* it produced a general turbidity without pellicle formation. *Gelatin* was not liquefied. In *litmus milk* there was an initial acidity without clot formation,



CASE 3.



CASE 4.

followed by alkalinity at the end of five days. It reduced *nitrates*, but did not produce *indol*, and failed to give a *Voges Proskauer* reaction.

Biochemical Reactions.—Acid but no gas was produced in glucose, lævulose, galactose, raffinose, dextrin, and adonitol, whereas no change took place in rhamnose, maltose, lactose, saccharose, inulin, starch, salicin, glycerol, erythrol, dulcitol, and mannitol.

Serum Reactions.—The patient's serum agglutinated *B. typhosus* only in a dilution of 1:30 and failed to agglutinate *paratyphosus* A and B; the organism isolated from his blood was not agglutinated even in low dilutions with either specific typhoid or specific *paratyphoid* A and B sera.

Case 5.—Was a native policeman admitted to Halfa Hospital suffering from pyrexia, headache, and very severe pains in the back and limbs.

Clinically the condition did not resemble a typical enterica infection; a noteworthy feature of the case was the slow pulse with a comparatively high fever. The latter fell towards the end of the second week, but was followed by a relapse in the third week.

Blood culture was carried out and the usual media inoculated.

Morphological Characters of the Organism.—The organism obtained from the blood was an exceedingly active motile Gram-negative bacillus. Its marked motility was certainly a characteristic of this bacillus. It measured 1·6 microns in length and showed no polar staining.

Biological Characters.—It grew well aerobically at 37° C. and 40° C., and was a capable anaerobe.

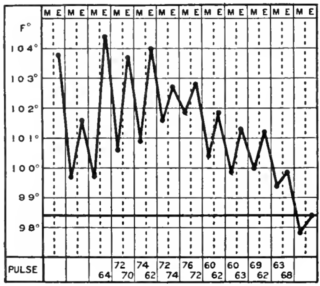
Cultural Characters.—On *agar-agar* the growth resembled that of *B. typhosus*, but was more viscid and more luxuriant. In *broth* a turbidity with pellicle formation was present, the pellicle falling later to the bottom of the medium.

In *gelatin* no liquefaction occurred.

Litmus milk was not acidified; at the end of forty-eight hours it was definitely alkaline, and at the end of a week the litmus colour was entirely reduced, the medium becoming white and still giving an alkaline reaction.

There was no *indol* formation, and no *Voges Proskauer* reaction. Nitrates were reduced.

Biochemical Reactions.—Acid but no gas was formed in galactose and mannitol, while an alkaline



CASE 5.

reaction without gas formation occurred in glucose, lævulose, rhamnose, maltose, lactose, saccharose, raffinose, dextrin, inulin, starch, salicin, glycerol, erythrol, adonitol, and dulcitol.

The organism produced in all these alcohols and sugars a pellicle which on shaking fell to the bottom of the media.

Serum Reactions.—The patient's serum completely agglutinated the bacillus isolated from his blood in dilutions of 1:30 and 1:60, this agglutination occurring spontaneously. Control normal sera did not agglutinate the organism.

The patient's serum did not agglutinate *B. typhosus* or *B. paratyphosus* A and B.

Specific *B. typhosus* and *B. paratyphosus* A and B sera failed to agglutinate this bacillus.

It was of interest to note that the sera of two other cases admitted to hospital about the same

time exhibiting the same clinical manifestations and types of pyrexia as that of Case 5 completely agglutinated the organism obtained from the latter case in dilutions of 1:30 and 1:60.

Case 6.—An Egyptian soldier admitted to hospital with headache and pyrexia. At the time that the blood culture was performed—about the tenth day of the illness—the patient was more or less stuporose, and had incontinence of urine and fæces and also epistaxis. The abdomen was tumid, the spleen slightly enlarged, and typical rose spots were present on the abdomen.

Morphological Characters of the Organism isolated from the Blood.—The organism obtained from the blood was a Gram-negative motile bacillus, showing no polar staining and measuring about 1·8 microns in length and 0·3 micron in breadth; some filamentous forms 7·5 microns in length were also present in young cultures.

Biological Characters.—It grew well aerobically at 37° C., and was capable of growth at 22° C. and 40° C. It was also a facultative anaerobe.

Cultural Characters.—On *agar-agar* the growth resembled that of *B. typhosus*. In *broth* there was a general turbidity without pellicle formation.

Specific *B. typhosus* serum (titre 1:2000 to 1:8000) completely agglutinated this bacillus in 1:2000, but in no higher dilutions, while *B. paratyphosus* A and B sera caused no agglutination.

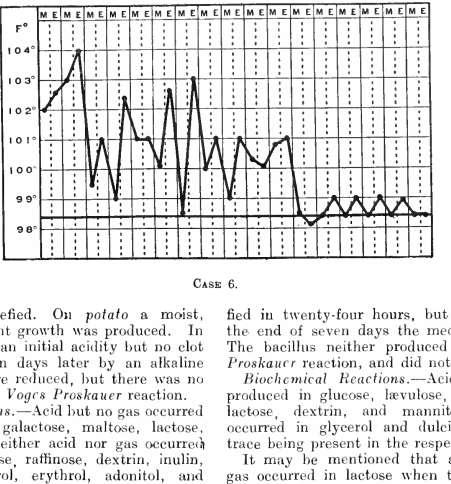
Case 7.—Was an Englishman admitted to hospital with pyrexia, headache, anorexia, constipation, sleeplessness, and a comparatively slow pulse. There was no splenic enlargement and no abdominal tumidity. A week following admission a papular rash appeared on the chest and abdomen. The fever ran its course in four weeks, the patient developing a femoral thrombosis about the third week of the disease.

Blood culture was carried out about the ninth day of the illness.

Morphological Characters of the Organism.—The organism isolated from the blood was an actively motile Gram-negative bacillus showing no polar staining.

Biological Characters.—It grew well aerobically at 37° C. and 40° C., and was a capable anaerobe.

Cultural Characters.—On *agar-agar* it produced a greyish white growth resembling that of *B. typhosus*. In *broth* a slight turbidity but no pellicle occurred. *Gelatin* was not liquefied. *Litmus milk* was acidi-



Case 6.

Gelatin was not liquefied. On *potato* a moist, white, but not luxuriant growth was produced. In *litmus milk* there was an initial acidity but no clot formation, followed ten days later by an alkaline reaction. *Nitrates* were reduced, but there was no *indol* formation and no *Voges Proskauer* reaction.

Biochemical Reactions.—Acid but no gas occurred in glucose, lævulose, galactose, maltose, lactose, and mannitol, while neither acid nor gas occurred in rhamnose, saccharose, raffinose, dextrin, inulin, starch, salicin, glycerol, erythrol, adonitol, and dulcitol.

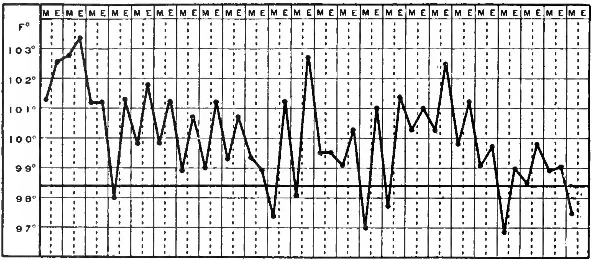
Serum Reactions.—The patient's serum at the end of the fourth week of illness completely agglutinated this bacillus in 1:50 and 1:100, and also agglutinated *B. typhosus* in 1:60, but failed to agglutinate either *B. paratyphosus* A and B.

fied in twenty-four hours, but no clot formed; at the end of seven days the medium was still acid. The bacillus neither produced *indol* nor a *Voges Proskauer* reaction, and did not reduce neutral red.

Biochemical Reactions.—Acid but no gas was produced in glucose, lævulose, galactose, maltose, lactose, dextrin, and mannitol. Acid and gas occurred in glycerol and dulcitol, only a minute trace being present in the respective tubes.

It may be mentioned that a minute bubble of gas occurred in lactose when the latter sugar was originally inoculated with the first subculture; this gas formation, however, did not occur when older subcultures were used.

Neither acid nor gas were formed in rhamnose, saccharose, raffinose, inulin, starch, salicin, erythrol, adonitol, and inosite.



CASE 7.

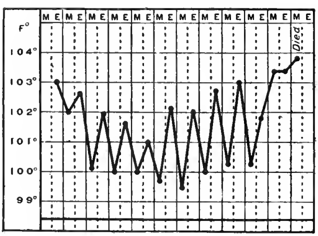
Serum Tests.—The patient's serum taken at the end of the fever completely agglutinated his bacillus in 1:30 and 1:60, the agglutination occurring almost spontaneously; it also agglutinated in the same dilutions a laboratory strain of *B. typhosus*, but did not agglutinate *B. paratyphosus* A and B.

Specific *B. typhosus* serum with a titre of 1:5000 gave a partial agglutination with this bacillus in a dilution of 1:2000; whereas *B. paratyphosus* A and B sera caused no agglutination.

Case 8.—Was an Egyptian soldier admitted to hospital with pyrexia, diarrhœa, and headache, and on the seventh day, when blood culture was carried out, was in a general typhoid state with considerable mental hebetude. The patient died at the end of the second week.

Morphology of the Organism isolated from the Blood.—Blood culture yielded a short motile Gram-negative bacillus showing no polar staining and measuring about 1·2 microns in length. Some filamentous forms were also present in young cultures.

Biological Characters.—The organism grew well aerobically and anaerobically at 37° C., and was capable of growth at 22° C. and 40° C.



CASE 8.

Cultural Characters.—On *agar-agar* a growth resembling *B. typhosus* was produced. In *broth* there was a general turbidity, but no pellicle formation. *Gelatin* was not liquefied.

This organism failed to produce indol and a *Voges Proskauer* reaction, but reduced nitrates. In *litmus milk* acid but no clot was produced in twenty-four hours, followed in four days by a permanent alkaline reaction.

Biochemical Tests.—Acid but not gas occurred in glucose, lævulose, galactose, lactose, saccharose, dextrin, inulin, salicin, dulcitol, mannitol, while neither acid nor gas occurred in rhamnose, maltose, raffinose, starch, glycerol, erythrol, adonitol.

Serum Reactions.—Specific *B. typhosus* serum (titre 1:2000 to 1:8000) failed to agglutinate this bacillus. Specific *B. paratyphosus* A and B sera also failed to agglutinate it.

Remarks.—The above described organisms have been isolated from the blood of enterica cases occurring in the Sudan during the past twelve months. These cases had never received protective inoculation. All the organisms isolated with two exceptions produced acid in lactose, and in other respects also differed in their cultural reactions from *B. typhosus* of Eberth and *B. paratyphosus* A and B. However, in order to establish their possible relationship with organisms of the typhoid-paratyphoid group, agglutination tests with specific sera were employed, as well as similar tests with the patient's sera against stock laboratory strains of *B. typhosus* and *B. paratyphosus* A and B.

The agglutination tests with the specific sera were carried out with cultures which had been previously repeatedly subcultured, while the patient's sera used for agglutinating the stock laboratory strains was obtained no earlier than the third week of the patient's illness. In four cases the results of the specific sera tests implied that the organisms isolated were related to those of the *B. typhosus* group, whereas in four tests that were carried out with the patient's sera against stock laboratory strains no agglutination occurred.

The bacillus obtained from Case 5 merits some attention as it differed markedly from the typhoid-paratyphoid group that it should be considered as alien to that group, more especially in virtue of its biochemical reactions producing alkalinity in most of the sugars and alcohols.

In the literature available, including the somewhat comprehensive list of intestinal organisms given by Castellani [2], no record of a similar organism can be found; accordingly, the name *B. vivax* is suggested for it as indicating its very marked motility and its alkaline-producing properties.

The bacillus isolated from Case 3 formed the only gas producer in the series, and according to Chalmers and Macdonald's [3] classification its position would apparently be in that of *B. wesenberg* group.

cultural reactions from those of the typhoid-paratyphoid group.

The whole subject is of importance, as the time assuredly will come when the question of protective inoculation against enterica in the Sudan will have to be considered, and it is only by the procedure of blood culture that any criterion of the type of the enterica causal organisms can be formed with a view to the preparation of suitable vaccines. The Gallipoli campaign demonstrated the fact that protective inoculation against typhoid conferred no immunity against paratyphoid, and it remains to be established whether typhoid-paratyphoid inoculation will protect against the entericas met with in the Sudan.

The following table shows the cultural and other reactions of the organisms isolated from the blood of enterica cases in the Sudan.

	Case 1	Case 2	Case 3 *B. wesenberg* group	Case 4	Case 5 *B. vivax*	Case 6	Case 7	Case 8
Motility	+	+	+	+	+ +	+	+	+
Gram's stain	—	—	—	—	—	—	—	—
Gelatin	—	—	—	—	—	—	—	—
Indol	—	—	—	—	—	—	—	—
Reduction of nitrate	—	+	+	+	+	+		+
Voges Proskauer	—	—	—	—	—	—	—	—
Glucose	A	A	AG	A	Alk	A	A	A
Lævulose	A	A	A	A	Alk	A	A	A
Galactose	A	A	AG	A	A	A	A	A
Rhamnose	—	—	AG	—	Alk	—	—	—
Maltose	A	A	A	—	Alk	A	A	—
Lactose	A	A	A	—	Alk	A	A	A
Saccharose	—	—	—	—	Alk	—	—	A
Raffinose	—	A	—	A	Alk	—	—	—
Dextrin	A	—	AG	A	Alk	—	A	A
Inulin	—	—	—	—	Alk	—	—	A
Starch	—	—	—	—	Alk	—	—	—
Salicin	—	A	—	—	Alk	—	—	A
Glycerol	—	A	—	—	Alk	—	AG	—
Erethrol	—	—	—	—	Alk	—	—	—
Adonitol	A	—	—	A	Alk	—	—	—
Dulcitol	—	—	A	—	Alk	—	AG	A
Mannitol	A	A	AG	—	A	A	A	A
Sorbitol	—	—	AG	—	Alk			
Litmus milk	A/Alk.	A/Alk.	A	A/Alk	Alk	A/Alk	A	A/Alk

A = Acid; Alk = Alkaline; AG = Acid and Gas; — = no reaction.

It is somewhat difficult at the present time to state what relationship these acid producers in lactose bear to Eberth's bacillus. Absorption tests may assist in throwing light on the matter. Apparently they seem to occupy some intermediate position between Eberth's organism and those of the paratyphoid group. Lisant Cox [4] in 1911 isolated several such strains from flies found in insanitary areas in Liverpool, but their clotting action on milk of these strains differentiates them from those met with in the Sudan.

More recently Chalmers and Macdonald [5] obtained from the fæces of enteric-like fevers in Khartoum and Omdurman an organism closely allied to the colon subgroup and Paratyphoid Gaertner subgroup. Their findings add further weight to the view that entericas in the Sudan are capable of being caused by organisms differing widely in their

Conclusions.

(1) Enteric-like fevers in the Sudan may be caused by organisms allied to, but differing culturally from, those of the typhoid-paratyphoid group.

(2) The diagnosis of these fevers should be established by hæmoculture in preference to agglutination tests, the latter frequently proving inconclusive and misleading.

(3) In the eight cases investigated six were caused by organisms which produced an acid reaction in lactose; one of these belonged to the *B. wesenberg* group.

(4) In one of the cases which proved to be an atypical enterica a hitherto undescribed bacillus was isolated from the blood. This bacillus was designated *B. vivax*.

Khartoum, March 31, 1918.

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THE JOURNAL OF

Tropical Medicine and Hygiene

DECEMBER 2, 1918.

PEACE AND ITS EFFECTS ON THE TROPICAL MEDICAL SERVICE.

WHAT will peace bring to that branch of the medical profession whose interests are bound up with tropical medicine? Have we anything to look forward to in the way of hopes or fears, of advancement, of better organization in the Colonial Medical

Service, or of improvement in opportunities of investigation?

That there will be increased demand for medical men for tropical practice, be it under Government or in private practice, would appear inevitable, as some at least of the German colonies will surely be allotted to Britain.

Is there any improvement needed in the method and manner in which medical men are equipped for work in warm climates? One great drawback to this department of medical practice was removed by the establishment of Schools of Tropical Medicine in London and Liverpool in 1899, where a department of medicine practically untaught in the medical colleges of the kingdom was introduced and approved of by Government. At these well-equipped schools, by attending a course of instruction, medical men are shown methods of investigation, of clinical research, and are instructed to the pathology and treatment of ailments hitherto unfamiliar to experiences gained in temperate climates. An improvement to be hoped for in this direction is that the attendance at the course shall be extended. Barely three months is allowed for the course; a time all too short even ten years ago, now still more absurdly short when the knowledge accumulated during the past decade is taken into account.

Another anomaly has to be dealt with. When a man comes home on leave to recruit and restore his health and energy after a spell of work—a doctor's work in a tropical climate—it is unfair that he should have to take three months from the time of that leave—it may be all the time allowed him—to study at a tropical school. The work is hard, study is close, examinations have to be prepared for, time for recreation is practically *nil*, and the opportunity for visiting his relatives or it may be wife and family reduced to a vexing minimum. Everything, in fact, is done to stifle study. It may be said this is not likely to occur in future, as everyone, before he goes out, goes through a course of training, so that his leave time need not be interfered with. Anyone familiar with the rapid advances in tropical medicine well knows that post-graduate study for tropical practitioners is imperative, unless they are to drift into routine and apathy. An occasional course has become a necessity. "Study leave" is therefore a point to be striven for, especially for men in the Colonial Medical Service: a period over and above the time of ordinary leave and added on to the full period of time allowed them at home.

The Colonial Medical Service.

Ever since Major-General George Evatt, C.B., raised the question of the organization of the Colonial Medical Service in the *British Medical Journal* in 1897, which was supplemented later by Sir James Cantlie at the meeting in 1898 at the Imperial Institute, when he proposed the establishment of a School of Tropical Medicine, this question of the organization of the Colonial Service has been nibbled at and half-heartedly dealt with. A statesman, closely studying the department of medicine as it now exists in our Crown Colonies and Protectorates, would condemn it, and could by a few strokes of his pen give us a well-conceived scheme to settle the problem. He would found his plan on the models of other public services, more especially the medical departments of the Army and Navy. His examination of the problem would reveal what to his mind would appear chaos. Here a whole-time, there a part-time man at work; rates of pay and pension in one colony altogether different in another; a service in which there is neither grading nor steps in rank, no stimulus in fact to advance in one's service, except it be to rise to that of colonial surgeon, a position in the nature of things open to few.

In West Africa alone would the inquirer into the status and position of the service find a really organized medical service, and if there, he may ask, Why not elsewhere? The answer will take time for him to grasp, for its details are so complicated, so overwhelmingly complicated, that he probably would, as many others have done, give up pursuing the matter with the idea of settling the question. The conditions of affairs in the West Indies, for instance, have no resemblance to those which obtain in the Far East. Mauritius is on a different footing to all others. The Sudan has its own special arrangements, and in fact the divergence of rules, pay, pensions, and system present a chaos of methods amounting to a seemingly insolvable puzzle. If the *details* are impossible to bring into line, surely the principles of dealing with the question of forming an organized service are not so complicated as to defy the mind of man or the capability of the constructive statesman.

In the first place, there is no common portal of entrance to the service. The selections are not made by competitive examination, but by nomination; this is rather an anomaly at the present day. Many contend, and with justice it must be admitted, that the selection of candidates by examination is not an unmitigated success, but is it not for the benefit of the service that even those applicants selected should not be examined as to their fitness? The Colonial Office authorities insist that men joining the service at home shall attend and pass the examination at the end of the course on Tropical Diseases at the Tropical Schools. This is another step in the right direction, although it is not, and perhaps it is better not so, competitive. Men joining *abroad* are instructed to take out a course whilst on leave in England if they have not done so previously. This plan has to be followed, as many doctors are appointed locally, not directly by the Colonial Office, although these appointments have to be confirmed subsequently by home authorities.

But given these variable forms of entry and subsequent discrepancies of pay, pensions, &c., it

would be a great step were the medical officers graded by reason of time of service, and perhaps also by capability, and stamped by a title designating the fact that they have risen through the several grades (see below).

1 to 5 years, Assistant Medical Officer, Colonial Service: A.M.O. (C.S.).

5 to 10 years, Medical Officer: M.O. (C.S.).

10 to 15 years, Senior Medical Officer: S.M.O. (C.S.).

15 to 25 years, Principal Medical Officer: P.M.O. (C.S.).

25 to 30 years, Inspector (C.S.), or some such title.

The pay in each grade should be fixed on a gold standard so as to make it universally applicable.

Special promotion for good work done should be instituted; the rank and pay not to be on the "time-limit" plan, but dating from the moment of promotion.

Transference on promotion from one colony to another is not always possible, but should be followed whenever and wherever possible. This is an excellent plan; it prevents men getting "stale" by residence in one place, and is followed in other departments of the Colonial Service with great advantage to both the officers and the Governments concerned. Even were the hints given followed, it would go far to bring the Colonial Medical Service into some sort of order, and help to infuse fresh life and enthusiasm in a branch of the public service which deserves encouragement, for it has been, and is still, the Cinderella amongst these services, and only requires the touch of an organizer, as well as of a statesman, to add to the attractiveness of the service for men of good parts.

Abstract.

THE RÔLE OF ANTISCORBUTICS IN DIETARY.[1]

By A. F. Hess.

From one standpoint our food-stuffs may be classified as essential and non-essential, according as to whether or not they are necessary for the maintenance of life and normal growth. Among the former group may be mentioned the proteins, inorganic salts, and the water-soluble and fat-soluble "vitamines" which recently have been the subject of so much discussion. The essential group includes also a food factor that is a necessary component of the diet if we would be protected against the development of scurvy.

In view of the present lack of knowledge it would be fruitless to discuss the question of the exact nature of this food factor—whether it should be termed vitamine, whether it is indeed a food substance, or whether it should be regarded merely as an activator or catalyzer of the food-stuffs. Unless the diet of man includes food possessing this antiscorbutic property, scurvy will develop in due course of time. From this point of view scurvy must be regarded as a deficiency disease. If, however, we would limit this term to diseases brought about by a deficiency of a definite chemical or biologic substance, then we are not at the present time warranted in thus classifying it. Nor is it necessarily true that scurvy is directly brought about by a lack of this accessory food factor. It is quite probable, as brought out elsewhere, that the lack of this factor leads rather to the development of substances which in themselves occasion the symptoms of the disease.

I have introduced the subject from this angle as its entire relevancy depends on the question of whether there are or are not antiscorbutic foodstuffs. If the protective or curative value of such foods are merely dependeut on their laxative properties, and interchangeable with laxatives, such as liquid petrolatum or phenolphthalein, then scurvy is in no sense whatsoever due to food deficiency, and has not a proper place in this symposium. Observations of many cases of infantile scurvy, however, have convinced us that constipation plays no essential rôle in this disease. In reviewing the many cases that we have seen we find that the infants were not constipated to a greater degree than normal babies, and that the disorder bore no parallel relationship to the activity of the bowels. Furthermore, potato, which is a sovereign remedy for scurvy, is not a laxative, and malt soup preparations, which most readily lead to this disorder, are rather laxative than constipating. To this evidence may be added a recent experience that infantile scurvy does not yield to treatment by liquid petrolatum, but that its symptoms are rapidly alleviated by small additions of orange juice to the dietary, so small as to be without apparent effect on the bowels. In this connection we may add an observation that will be referred to again in its relation to the therapy of this disorder—namely, that orange juice, boiled and rendered slightly alkaline, may be given intravenously with signal success; this procedure leads to no laxative action, and it is evident that its effect cannot be explained in this way. The nature of the antiscorbutic potency of orange juice remains as much an enigma to-day as ever. Recently we made use of artificial orange juice, prepared according to the formula found of marked therapeutic value in the scurvy of guinea-pigs. After a trial of three weeks, however, it was found to be ineffective; on substitution of orange juice in the same dosage, the hæmorrhage of the gums disappeared within a few days.

It will be of advantage to digress for a moment to say a few words concerning the relationship of the so-called guinea-pig scurvy to that of human beings. There is great danger of error in translating

[1] Abstracted from *Journ. Amer. Med. Assoc.*, September 2, 1918.

the results obtained on these animals directly into terms of the human disease. It would seem that much of the confusion of thought and difference of opinion at the present time as to the nature of scurvy is due to the fact that some are thinking of a disease which they have produced in animals, and others of scurvy as they have encountered it in man; furthermore, that some have brought about a disease in animals by means of one diet, whereas others have employed a diet of quite different nature. These divergences can be harmonized only by a study of the pathology of the disease. At present the diagnosis of scurvy in guinea-pigs, in most investigations, is based solely on clinical signs, uncontrolled by microscopic examination of the bones, in spite of the fact that there are osseous changes which are typical of this disease. The pitfall of omitting histologic examination may be judged when we state that recently we have found that guinea-pigs fed on certain diet may manifest typical signs of scurvy, and yet microscopic examination of the bones suggests that we are dealing with rickets and not with scurvy. It would seem as if many results are to be interpreted in this way. Some of the scurvy in guinea-pigs may be rickets or pseudo-scurvy. At any rate, if we are to avoid great confusion, and a repetition of an error similar to that which delayed for years the differentiation of congenital syphilis from rickets in human pathology, all reports of experimental scurvy should be controlled by careful pathologic examinations.

Every individual requires a certain amount of antiscorbutic substance in his dietary, or, to put this statement in a broader way, every nation has need for a per capita quota of food-stuffs containing this necessary food factor, if scurvy is to be avoided. How much of this type of food is required, in other words, what is the antiscorbutic minimum for the individual or for the nation, is just as little known as is the minimum requirement of other so-called vitamines. The margin of safety over our annual supply is certainly not very great, assuredly not as large as the excess of water-soluble vitamine, which is so abundantly distributed throughout nature, and probably no greater than that of the fat-soluble vitamine shown to be present to a considerable extent in milk, eggs, and the leaves of plants. How scant is the margin of safety in some countries may be judged from the fact that in Ireland they are dependent for their health in this regard on the potato—when the crop fails scurvy develops. That we in the United States are not entirely independent of the potato crop for our antiscorbutic supply was shown in 1916, when, as you remember, we had to depend on an exceptionally poor yield of the previous year. As a result of this potato deficiency scurvy developed in numerous institutions in the spring; in one there were to my knowledge more than twenty deaths; in another, in which the amounts of vegetables, and more particularly of potatoes, received during the months of January, February, and March were far below what were needed and requisitioned, scurvy broke forth in April and attacked more than 200 inmates. It may be added that when 200 cases of frank scurvy are diagnosed in an institution there are probably an equal number of latent cases which escape observation, for we must remember that it takes about six months of food deprivation for an individual to manifest scurvy.

Scurvy has not only a civil but also a most important military aspect. As is well known, it was at one time the scourge of armies. In de Joinville's account of the Crusade of Louis XI, we read of its attacking the troops in Palestine; in Lind's classic monograph on this disease, it is recorded that "when the Swedes carried on a war against the Muscovites, almost all of the soldiers of their army were destroyed by scurvy. But we do not need to retrace our steps so far to learn of the appearance of scurvy in the army. In the "Medical and Surgical History of the War of the Rebellion" we find the following statements:—

"A scorbutic tendency was developed at most of our military posts during the winter season, after the troops had been confined to the use of the ordinary ration with desiccated vegetables. The latter in the quantities failed to repress the disease. At posts which could be readily supplied with potatoes only the taint was manifested, on account of a want of liberality in the issues." And again: "Among the white troops during the five and one-sixth years covered by the statistics, 30,714 cases of scurvy were reported; and 383 deaths were attributed directly to that disease."

In the present War, among some 800 troops, at least 95 per cent. had scurvy in the spring of 1917, and since then epidemic centres have been recognized outside of this sector.[1]

While I do not wish to over-estimate the importance of this disorder, I do wish to lay stress on the fact that it is a disorder that must be considered both in civil and in military practice, and that unless we distinguish between those food-stuffs which possess and those which do not possess antiscorbutic value, scurvy will cease to be an exceptional disease. In this regard it may be of advantage to summarize some personal experiences with various antiscorbutics, a detailed account of which will be reported elsewhere. We have found that the bran and germ of the wheat seed and brewers' yeast—substances which are so effective in preventing beriberi—are of no value in warding off scurvy. Dehydrated vegetables retain but little of their antiscorbutic power. We have employed dried carrots in two cases of infantile scurvy, and have found it lacking in curative power. It will be

[1] Undoubtedly scurvy has increased recently both in the civil and military population of the warring countries. We read of a marked increase of this disorder in the Poor Law hospital in Glasgow (*Lancet*, London, 1917, ii, 21) as well as in the Poor Law infirmary of Newcastle (*Brit. Med. Journ.*, 1917, ii, 46). In both instances this increase is attributed to replacing potato in the dietary by bread. From Russia comes a report of the occurrence of 500 cases in Petrograd. During the spring of 1917 an outbreak associated with neuritis invalided Italian troops on active service.

remembered from the quotation cited above that such was the experience in the army in the Civil War. The vegetable which we tested had been heated to a temperature of only from 130° to 135° F., and was attractive in appearance and in flavour. However, "the accessory food factor" had evidently been destroyed. It was employed some weeks after drying, having been kept during the interval in paraffined bags. Feeding experiments with animals that were fed with dehydrated vegetables obtained from various sources led to the same result. We do not, by any means, wish to deprecate the use of dehydrated vegetables, for we appreciate their food value and the great advantage that they possess on account of their small bulk. However, I would emphasize the fact most strongly that they cannot be considered the food equivalent of fresh vegetables, and that unless they are given in conjunction with fresh vegetables, fresh fruit or other antiscorbutic, the dietary will induce scurvy. It is quite possible that improved methods of preparation, as regards the temperature or the state of moisture in connection with the dehydration, may make it possible to overcome this limitation.

The same defect that applies to dried vegetables seems to hold in regard to fruits. Prunes, which are used so extensively in the dietary of infants, possess practically no antiscorbutic power. In this connection I may add that the banana, which would be of great value in this respect, on account of its ready preservation throughout the winter, seems to be singularly poor in antiscorbutic power.

It is clear that there is a need, not only of an exact inventory of antiscorbutic food-stuffs, such as has been recently undertaken by the Lister Institute,[1] but of efforts directed to enlarge their number. Looking toward this end, I suggested a few years ago the use of the orange peel, instead of or in conjunction with the juice of the orange, in the dietary of infants who are not receiving fresh food. Since this time I have made use of an infusion of the peel[2] in a large infant asylum, and found it entirely satisfactory. At a time when oranges are so expensive, and the cost of food has become such a serious item, both for the individual and for institutions, it seems as if this suggestion may be welcomed by the housewife and baby welfare stations. Some arrangement seems possible whereby hotels would save these orange peels for this purpose. By this procedure we obtain about twice the quantity of antiscorbutic material from the orange.

Orange juice, boiled and slightly alkalinized with normal sodium hydroxide, constitutes an excellent antiscorbutic agent for intravenous use. It can be given in doses of 1 oz. without occasioning the slightest reaction. This measure is of interest from the standpoint of the pathogenesis of this disorder, and on account of its rapidity of action might be of therapeutic value in combating a large number of cases of scurvy in the advanced stage of the disease.

There are some who are of the opinion that scurvy is of bacterial origin, that it is indeed an infectious disease. This point of view was maintained by the famous Boerhaave and supported by Villemin in the seventeenth century; it is held by many of the physicians in Russia to-day, and has been emphasized in a recent study on experimental scurvy. To my mind, when an invasion of microorganisms occurs it is to be regarded as secondary in nature and merely grafted on the nutritional disorder. I bring this aspect of the subject forward at this time to show the important relationship between nutrition and infection, and furthermore to illustrate by means of this example how simple food-stuffs are able to prevent and to cure a systemic infection. In the case of scurvy the fresh vegetables or fruits protect the tissues, not so much by increasing the immunity of the body fluids, but by rendering normal and impermeable the mucous membranes. This constitutes a most remarkable instance of the broad scope of dietetic therapy.

[1] Chick, T., and Hume, M.: *Trans. Soc. Trop. Med. and Hyg.*, 1917, x, 141.

[2] The orange peels are washed, grated, and added to twice their volume of boiling water. This is allowed to stand over night, then strained and is ready for use. Sugar is added when necessary to make it palatable.

Notes and News.

THE FUTURE OF FUEL.

When coal is exhausted the most obvious method of procuring fuel is to grow plants. Such fuel used as mere firewood would be wasteful; and the form most likely to be utilized will be the cultivation of plants that store the solar energy in the form of starch and sugar which can be converted into alcohol. This is already being done to some degree to supplement the petrol production at present. The question arises with the growing population of the earth: Is there sufficient land to produce food for men and animals, as well as to give us sufficient vegetable material for heating?

SHRIMPS.

At Mazatlan, on the Pacific coast of Mexico, a large shrimp industry is arising. Sluices admit the sea water into lagoons, in which is a weed or grass that grows from the bottom and is locally known as *paiste* (scientific name?); this affords food for the shrimps, which grow to an average length of 4½ in. The shrimp industry at Mazatlan provides three forms of the preserved product: (*a*) Mexican shrimp, which is salted, dried and packed in mat bags with the head and shell on; (*b*) China shrimp, which is cooked with a little salt, and dried with the head and shell removed; (*c*) canned shrimp for local distribution.

The available supply is ten times the present quantity utilized.

Original Communication

SOME OBSERVATIONS ON BLOOD PARASITES.

By F. G. Cawston, M.D.Cantab.

Minute parasites, such as the malaria parasite, float in the blood-stream, but accumulate in great numbers in the spleen. The somewhat larger trypanosome is also found in the peripheral circulation, but is more common in the lymphatic glands. Filariæ, which are considerably larger, migrate to the peripheral blood-vessels at night time, when they are most likely to meet their intermediary host, whose nocturnal habits are well known. As might be expected, the largest parasites of the blood-stream are seldom found in the general circulation, and select certain blood-vessels as their seat of abode. The lung-fluke is practically confined to the blood-vessels of the lungs; here constant irritation and hæmorrhage takes place as a result of the escape of eggs with the sputum. *Schistosomum mansoni* inhabits the small vessels of the intestine where the female lays her eggs. These escape through the intestinal wall by means of sharp lateral spines. *S. hæmatobium* occurs in the portal system and vesical veins; but the adult female burrows as deeply as possible into the capillaries of the bladder, so as to procure an easy escape for her spine-pointed eggs. Their escape produces continuous hæmaturia.

In each case the parasite has chosen a site for laying her eggs where ready access to fresh water is procurable.

Parasites which multiply in the blood-stream and produce marked symptoms, such as the malaria, have received due attention. The larger parasites which occur in the peripheral circulation only at intervals escaped our notice for a while. Less attention has been directed to the macroscopic parasites which have selected certain defined areas of the blood-stream, both in human and veterinary research. In the latter sphere care has been directed to the presence of parasitic affections in the various glands and muscles, but comparatively little search has been made for parasites in the blood-stream itself. The same is only too true of post-mortem work, with the result that a large number of trematode parasites have escaped detection so far.

Besides the true *S. hæmatobium*, we have isolated in South Africa three other members of the Schistosome group, one furcocercous eye-spotted form and six other trematode parasites whose life-history awaits elucidation.

There are at least four distinct species of furcocercous cercariæ in South Africa. Three of these answer to the recognized description of the Schistosome group, in being without a pharynx and possessing a divided tail. Another is separated from them in possessing eye-spots, *C. oculata*. The *Bilharzia* has been found in *Physopsis* only at Durban, Maritzburg, Rustenburg, Magaliesburg, Nijlstroom, and Mulder's Drift. Another member of the Schistosome group, *C. secobii*, has been isolated from *Physopsis* only at Martizburg; it is probably an avian trematode. A third infests *Isidora schakoi* at Potchefstroom, and has sword-like prongs to its forked tail—*C. gladii*.

So far, experiments to infect *Isidora schakoi* with miracidia obtained from the urine of Bilharzia patients have proved unsuccessful. In December, 1917, a large number of ova producing living miracidia were obtained by centrifugalizing the urine of a Bilharzia patient. These were added to a vessel of water containing about fifty specimens of this snail. At the end of three days practically every snail was dead, whilst a similar number untreated by miracidia were unaffected. There can be little doubt that these snails were killed by over-infection.

It is of interest that M. Kumagawa of Tokio, in Japan, reported in the *Tokio Medical Journal* for September, 1913, that young rediæ and cercariæ developed in susceptible snails—*Blandfordia nosophora*—twelve days after being exposed to infection with the ova of *Schistosoma japonicum;* but we are not told what measures were adopted to ensure that these snails were not already infected. It is difficult to ascertain how far the rediæ and sporocysts described in specimens of *Planorbis guadelupensis* in Venezuela, as reported by J. Iturbe, 1916, were not already infected when the experiments began.

On December 10 about seventy-five specimens of *Isidora schakoi* were obtained from the golf links at Potchefstrom and exposed to possible infection by miracidia from Bilharzia urine. Only about half the number were found to survive the twenty-five days they were kept in captivity.

On December 26 six were found to be free from cercarial infection, and one contained a young sporocyst branching throughout the liver-substance. Within this sporocyst were young undefined cercariæ; their tails had not yet begun to form.

On January 3 seven healthy specimens were examined and one infested with well-developed leptocercous cercariæ developing in sporocysts, presenting the appearance of the liver-fluke parasite.

On January 4 seven specimens were found to be free from infection and one contained sporocysts with tailed cercariæ. These cercariæ were still very young, and I am not in a position to say whether their tails might have developed prongs at a later date.

Conclusions.

(*a*) That the majority of the specimens used in the experiments were free from cercarial infection.

(*b*) That miracidia from Bilharzia urine may kill specimens of *Isidora* from over-infection, but are probably incapable of developing in this snail. This opinion is supported by the entire absence of Bilharzia disease in some localities where *Isidora* exists and *Physopsis africana* is not to be found.

(*c*) That snails exposed to infection from Bilharzia urine must be kept living for at least a month or six weeks before being examined for Bilharzia cercariæ.

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PLAGUE AND ITS PERSISTENCY.

THE reports from India show that plague continues its ravages, now waning, now increasing, but still persistently holding its grip on the country. In China, and, in fact, wherever plague has appeared its persistency is the chief feature of the disease. This fact has been a prominent one ever since plague first appeared in history, and it continues to-day as markedly as ever. The modern epidemic was made known to modern literature by a full telegraphic account of the disease which appeared in the *British Medical Journal* in 1894, sent by the writer from Hong Kong. This was preceded by a short telegram which appeared in the same journal. The first European doctor to notify the disease was Dr. Alexander Rennie, of Canton, who sent a note to the writer that plague existed to a great extent in Canton. That the rat was the cause of the disease was first brought forward by a clergyman in Hong Kong, who brought his Bible and explained to the writer the Biblical account of plague in I Samuel, chapters 3rd, 4th, and 5th. He ended his exposition by stating "The rat is the cause of the spread of plague; destroy the rat and you get rid of plague." How true his contention was is now a world-wide belief. This fact was known in the days of Samuel, but it was forgotten, as many other Biblical, physiological, and hygienic facts are, to the detriment of mankind.

The cause of the persistency of plague is now understood, for so long as the rat is infected in a locality, so long will man be liable to the disease.

Plague when it last visited London in the seventeenth century remained for a hundred years, the last entry in the records of St. Martin's-in-the-Fields, being made in 1780.

The present epidemic has persisted in Hong Kong since 1894, and in India since 1896 when it first appeared in Bombay.

The appearance of the disease naturally created a great scare, and at both places the most palpable outcome was the damage to the shipping in both ports which the appearance of the disease entailed. Hong Kong harbour, one of the most frequented in the world, was empty, the busy streets were deserted, the hospitals were full to overflowing. How different to-day, although plague still claims its victims! The strict quarantine regulations have long been in abeyance, and the streets are as busy as ever. It is twenty-five years ago since the epidemic began in Hong Kong, and it remains with a persistency which, although not causing scenes of alarm, as in 1894, is nevertheless perfectly definite. In 1896, when plague appeared in Bombay, not only the Indian Government was deeply concerned, but the subject became of Imperial importance, and was eagerly discussed in the Houses of Parliament. Being an Indian concern the Secretary of State for India was consulted, and the India Office referred the matter to Surgeon-General Hooper and Sir Joseph Fayrer. They sought the writer's advice, he being in England at that time, and, with the exception of Dr. David Lowson, the only man in the British Isles who had ever seen plague besides the writer.

To their inquiries the writer gave what little advice was available, and when asked how soon

might we expect to get rid of the disease from Bombay he said, "In one hundred years." Surgeon-General Hooper said: "I dare not go back to the Government and the Houses of Parliament with that reply; the members of both Houses are most anxious about the matter, and want to be assured as to the date of the disease being exterminated."

As yet only a quarter of a century has elapsed since the modern epidemic of plague appeared in Asia, and the disease prevails to-day to an extent which at one time would have been regarded with alarm.

As illustrative of this prevalence it is only necessary to state some of the recent returns from India:—

During January, 1918, total deaths from plague, 107,213.

During February, 1918, total deaths from plague, 118,259.

During March, 1918, total deaths from plague, 120,194.

Plague seems as deadly and as widespread as ever during the first three months of 1918, i.e., twenty-two years after the original outbreak.

Yet with this enormous list of dead we seldom hear of plague in India nowadays. We have become accustomed to it, as we have to, say, measles in Britain. We accept the presence of the disease, and are more or less content to sit down under it and submit to its onslaught. Meantime influenza holds the field, yet the death-rate from influenza, although high in India, does not certainly exceed the death-rate from plague, and whereas influenza is an ephemeral disease, coming, as cholera does, for a spell of a few weeks in any one place, plague persists year after year, waning in the summer seasons, only to recur in the winter with its hundreds of thousands of victims. When mentioning the seasonal variation, we are quite aware that, although the prevalence is greater in India in the winter months, this is not always the case in other countries, as in South China for instance where the yearly date of recurrence is in the summer, not in winter.

If as mentioned above plague usually lasts for about one hundred years, when once it has gained a hold in a country are we to stand by and fold our hands and accept the apparently inevitable? Are we to shape our course along the lines of those who say, as some Indian residents do, "Oh, no one takes any notice of plague nowadays; we get inoculated regularly and think no more of it"? Were inoculation universal this might be advanced with some show of reason; but neither the natives in India nor the natives of any country are willing to be inoculated unless in the presence of a scare. Were inoculation against plague as widely followed as in the case of small-pox some hope of keeping the disease in check might be entertained; but this is far from being the case.

Another way to tackle the problem is by rat destruction; this has been attempted in isolated places, but if it has ever been attempted on a great scale in India it has proved a failure. So far as we know the destruction of rats in India has not been on a general or national scale, but local only, and consequently imperfect and unsuccessful. The campaign must be no mere spasmodic effort, but a sustained and continuous endeavour. This requires expenditure of a large sum of money and of a personnel of ample proportions. We are aware that in several parts of India objections are taken to the slaughtering of animals, even of the verminous rat, but this can be circumvented and without offending religious susceptibilities if dealt with sympathetically and judiciously. In the plague-infected districts, were propaganda instituted bringing home to the natives the ravages of plague in their district, and the leading men called together by a commission acting with the authority of Government, much could be done. It is presumption to assume that little has been done to meet this calamity to India; it is not true that a great deal has not been done, but whatever has been done has evidently proved a failure. Are we, therefore, to accept the teaching of thousands of years that all hopes of getting rid of plague under the "hundred years" which experience has taught us is the usual period of its stay? The Philistines knew the means by which plague was spread. We have advanced but little in our knowledge of the epidemiology of plague; we have been able to show that other animals may spread the disease, but the rat still holds the primary place in the transmission. Of the treatment of the disease itself we practically know nothing; of the means of checking or eradicating the disease our modern practical hygiene has proved a failure up to now. It behoves us, therefore, to bestir ourselves and not sit still with folded hands and do no more than the Philistines, who, by offerings to the great God of Israel, hoped to allay the ravages of this the greatest pest of mankind. Other epidemics are short-lived, but plague is an epidemic in a different sense, for its stay is little short of a century, as proved by history, and this fact seems about to be perpetuated in the present epidemic, for a quarter of a century has passed since it appeared in Asia, and there is no sign of its abating.

J. C.

Notes and News.

At King's College, London, an instrument entitled the optophone was recently exhibited. It is based on the discovery that selenium possesses the unique property of transmitting light energy into sound energy. By means of an apparatus named the optophone, which contains a rotating selenium disc carrying any desired document, and illuminated from below, the blind are enabled to read by interpreting the sound—each sound having a definite alphabetic value.

Abstracts.

FURTHER EXPERIENCES WITH THE KONDOLEON OPERATION FOR ELEPHANTIASIS.[1]

By W. E. Sistrunk.

Kondoleon, of Athens, in 1912, first reported this operation to establish, by a wide excision of the aponeurosis, a communication between the superficial and deep lymphatic channels. The deep aponeurosis seems distinctly to separate the superficial from the deep group of lymphatics. In elephantiasis, the œdematous and hypertrophied tissues are found to lie above the aponeurosis, while the subaponeurotic tissues are usually quite normal. When large pieces of this tissue are removed, sufficient communication may be established to allow the deeper group of lymphatics and the muscles to drain the stagnant lymph ordinarily handled by the blocked superficial group, and this very markedly benefits the condition. The technique is as follows:—

Long incisions are made along the outer and inner aspects of the affected limb, and through each of these a large slice of œdematous fat is removed. The aponeurosis is then opened and a portion of it, three or four fingers in width, is excised throughout the entire length of the skin incision. The wound is then closed without drainage in such a way that the skin, with a small amount of subcutaneous fat attached to it, comes in contact with the exposed muscles.

The first article in America calling attention to and commending this operation was published in 1913 by Matas[2] of New Orleans. He discussed in detail the etiologic factors that contribute to the production of true elephantiasis, giving his own opinion and that of others regarding the part which bacteria, usually streptococci, play in the production of this condition, and emphasizing repeatedly the necessity of such bacterial invasion in order that a true elephantiasis may be produced. Lymphatic or venous stasis, from various causes, usually precedes and is the predisposing cause of the bacterial invasion, although, according to Matas, many writers believe that true elephantiasis may occur independently of lymphatic or venous obstruction and solely as a result of repeated attacks of streptococcic infection. Matas states that the histopathologic elements that are essential to complete the picture of elephantiasis are (1) a mechanical obstruction or blockade of the veins and lymphatics of the affected region, usually an obliterative thrombophlebitis or lymphangitis or adenitis; (2) hyperplasia of the collagenous connective tissue of the hypoderm; (3) gradual disappearance of the elastic fibres of the skin; (4) the existence of a coagulable dropsy or hard lymphœdema; and (5) a chronic reticular lymphangitis caused by secondary and repeated invasion of pathogenic micro-organisms of the streptococcic type. In conclusion he reports two cases in which operation was performed, one by himself and the other by his associate, Gessner, which were the first cases in America in which the Kondoléon operation was used.

The operation has been performed in the Mayo Clinic in seven instances. I have reported three of these cases in a recent article on the subject. In three of the patients the disease was located in the left arm, and in the other four patients, in one of the lower extremities.

In the first arm case an elephantiasis had developed following an infected vaccination wound, with repeated erysipelatous attacks in the affected arm. The next arm case in which operation was performed was one of a simple lymphœdema of the arm following the radical removal elsewhere of the left breast and axillary glands for a supposed malignant tumour of the breast, but which was afterwards proved to be benign. In the third arm case, an elephantoid condition had resulted from an injury to the arm two years previously.

In one of the leg cases, a woman aged 23, the condition was probably congenital, having been first noticed when the patient was a child 1½ years old. In another case of a girl, aged 17 years, who had had trouble for six years, no etiologic factor was obtainable. Her tonsils were septic, and were removed following the operation. The third leg case in which operation was performed was that of a child with a chronic tuberculous synovitis of the knee and tuberculosis of the inguinal lymph nodes on the affected side. The fourth case was in a woman of 21. The condition had developed six years previously, following an attack of tonsillitis, with subsequent arthritis, which was accompanied by fever. At the same time she also had four large boils on her face and right arm.

In all of the leg cases there was marked thickening of the dermal and hypodermal tissues with marked œdema and thickening of the aponeurosis, but in none of these could a history of recurring erysipelatous attacks be obtained.

The results obtained in the arm cases were not so satisfactory as those in the leg cases. In each case improvement was quite marked shortly after the operation, but in two instances the patients still report some swelling which fluctuates in its extent. In the patient in whom the trouble had developed following vaccination, the arm and forearm have returned to normal, but a swelling of a fluctuating type still persists on the dorsal surface of the hand.

In all of the leg cases the improvement was very striking and occurred almost immediately following

[1] From the Mayo Clinic. Read before the Section on Surgery, General and Abdominal, at the Sixty-ninth Annual Session of the American Medical Association, Chicago, June, 1918. (Abstracted from the *Journ. Amer. Med. Assoc.*, September 7, 1918.)

[2] Matas, Rudolph: "The Surgical Treatment of Elephantiasis and Elephantoid States Dependent upon Chronic Obstruction of the Lymphatic and Venous Channels," *Amer. Journ. Trop. Dis. and Prev. Med.*, 1913, 1, 60-85.

operation. In the first of these operation was performed one and one-half years ago (previous to June, 1918), and the others eight months, four months, and two months ago respectively. All were heard from or seen during April or May, 1918, and in each case the improvement has been very marked and has persisted.

We were able to grow streptococci from the verrucose formations which were present in certain areas on the arm of the patient who developed elephantiasis following infection in the vaccination wound. However, although cultures were made from the œdematous fat and thickened aponeurosis in nearly all of the other cases in which operation was performed, streptococci or other pathogenic organisms could not be grown. In the first patients operated on no microscopic examinations were made of the tissues removed. In the later cases, however, careful examinations of these were made with the same findings as those reported by other writers.

Examination of Tissues.

The epidermis was reduced in thickness with a marked thickening of the dermis. A large amount of fat was present underneath the dermis, which was separated into lobules by fibrous connective tissue trabeculæ. These trabeculæ connected with the aponeurosis, which was also greatly thickened.

Microscopically, there was a reduction in the thickness of the epidermis. The epithelial papillæ were very much diminished in length, and, in a number of areas, they had completely disappeared. The dermis showed a marked thickening and fibrosis. The sweat glands were partially compressed by the excess of fibrous tissue, while the veins and lymphatics were dilated. The elastic tissue of the skin had entirely disappeared. The fibrous trabeculæ which separate the fat lobules and connect with the aponeurosis showed numerous dilated veins, capillaries, and lymphatics, and also small groups of leucocytes. The aponeurosis presented a picture similar to that of the trabeculæ. There were evidences of œdema throughout the tissue.

Technique of Operation.

Better results were obtained when a fair amount of hypertrophied skin was removed in addition to an extensive removal of the œdematous fat, and it was necessary, in order to obtain the best results, to remove a wide strip of aponeurosis. Since we have practised the removal of the skin we have changed slightly our method of procedure, although we achieve, in the end, results identical, except for a wider removal of skin and fascia, with those obtained in our first cases. At present we perform the operation as follows:—

A long modified elliptic incision, which includes the skin to be sacrificed, is made on one side of the affected limb. On the outer aspect of one of the lower extremities this incision would extend from the trochanter to the external malleolus. Then, in order to facilitate a wide removal of the subcutaneous fat, the skin is reflected on each side of the incision for a distance of about 1 or 1½ in. The skin is retracted, and underneath each of the reflected skin edges a long incision is made through the œdematous subcutaneous fat down to and including the aponeurosis. These incisions are made almost parallel to the original skin incision. Included between them is a quadrilateral piece of œdematous fat and aponeurosis. At the upper end these two incisions through the aponeurosis are connected by a transverse incision. The tissues to be removed are now free except for the attachment of the aponeurosis to the underlying muscles. By traction on the tissues that are to be removed, it is very easy to dissect the aponeurosis from the muscle throughout the length of the entire limb and to remove in one long piece the skin, œdematous fat, and aponeurosis. A number of vessels which tend to bleed profusely are encountered. These are temporarily controlled with forceps. After the tissue has been removed these forceps are taken off, and surprisingly few of the vessels will be found to need ligatures. The wound is closed with interrupted silkworm-gut stitches, without drainage. It is necessary to do a similar operation on the opposite side of the limb. If the patient's condition permits, we usually do this as soon as the first operation has been completed: if not, after a period of eight or ten days have passed. The tissues, although diseased, heal remarkably well, and in none of the cases in which we have operated has there been the slightest infection.

After operation the patient is kept in bed for eight or ten days. An elastic bandage is then applied and the patient allowed to get up and walk about. We have advised the use of this elastic bandage for several months, and if there is a tendency toward swelling when it is removed, it should be worn for an indefinite period. The suggestion of Matas, to administer antistreptococcic serum or vaccine at intervals for some time after the operation, has been followed.

Our experience with the operation leads us to believe that in this we have a procedure whereby much aid can be offered to patients suffering with a true elephantiasis, and especially so to those in whom the condition is present in the lower extremities.

Report of Cases.

Case 1.—A woman, aged 21, with the congenital type of elephantiasis of the left leg, which had been present since she was 1½ years of age, was first seen in the Mayo Clinic at the age of 15. At that time there was a tremendous enlargement of the left foot, leg, and thigh, and a marked thickening of the skin covering these. In August, 1911, according to Handly's method, one silk strand was placed on the outer and one on the inner aspect of the leg, from the ankle to the region of the left groin. The

patient returned six months later without improvement; in fact, the enlargement had increased. In February, 1912, a double silk strand was placed subcutaneously on the outer and inner aspects of the leg, and the inner of these strands was extended upward into the fat of the abdominal wall, while the outer strands were carried as high as the left axillary line. The condition remained unchanged until her return more than four years later. At this time, December, 1916, an operation of the Kondoléon type was done, first on the outer side of the leg, and about one month later on the inner side. The improvement was marked from the beginning, and at the time of her discharge, in March, 1917, the leg was much smaller than before the operation. A letter received in May, 1918, stated that the leg at present was smaller than when she left here, and that she was able to walk and even to run with but slight inconvenience.

Case 2.—A woman, aged 20, with elephantiasis nostras, presented a history that was negative until she was 11 years of age, when there was a severe infection following vaccination on the left arm. After the vaccination wound healed she was in good condition until two years before coming to the clinic. At this time swelling of the left hand had developed, and had slowly progressed until the forearm and arm were involved in the process. She had had many attacks of erythema in the swollen portion. The history and findings in this case have been reported in detail by Elliott. At the time of our examination, July 9, 1917, the patient presented a diffuse swelling of the arm, forearm, and hand. The swelling was much more marked in the hand and gradually diminished up to a point a few inches below the acromion process. It also involved the proximal phalanges of the fingers. There was a definite thickening of the skin. July 13, an operation of the Kondoléon type was performed through incisions 5 or 6 in. long on the anterior and posterior surfaces of the arm and forearm. No incisions were made on the hand. Considerable improvement followed in the arm and forearm, but the condition in the hand remained stationary and some swelling also remained about the elbow. A second operation was done, September 29, at which time two incisions were made on the dorsal surface of the hand and one on each of the lateral surfaces of the elbow. Multiple incisions were also made on each proximal phalanx of the fingers. The arm and forearm have returned practically to normal. Following the second operation there was considerable improvement for a while in the hand; later, however, the dorsal surface of the hand had a return of the swelling, and at the present time (June, 1918) it is swollen.

Case 3.—A woman, aged 51, had lymphœdema of the left arm following amputation of the breast with removal of the axillary glands, done elsewhere. The wound had not been infected. Two months after the operation the arm began to swell, growing slowly but progressively worse and involving the dorsal surface of the hand, the forearm, and the arm nearly as high as the shoulder-joint. There was no thickening of the skin. September 1, 1917, a Kondoléon type of operation was done. Long incisions were made on the outer and inner aspects of the arm and forearm from a point a few inches below the shoulder-joint down to the wrist; also two incisions were made on the posterior surface of the hand. The swelling in the hand decreased at once, and there was marked improvement in the arm and forearm for a time. A recent letter (May, 1918) would lead us to infer that there is slightly more swelling at this time than there was when she was discharged from our care. This, however, is of a fluctuating character, and is less at times.

Case 4.—A woman, aged 43, with an elephantoid condition of the left forearm, had a fall down stairsteps two years before being seen in the clinic, with injury to the left forearm. Three days later the skin on the outer surface of the forearm became red and then black, and remained so for two or three weeks. Three months later the forearm swelled, and remained so until she was examined here in January, 1918. At times there was also swelling on the dorsal surface of the hand. When seen the patient was found to have a swelling of the left forearm, with considerable thickening of the skin. January 12, an operation of the Kondoléon type, similar to the one described in the previous cases, except for the fact that no incisions were made on the dorsal surface of the hand, was done. There was marked immediate improvement which persisted until April 1. The patient, in a recent letter, states that at this time the forearm from the elbow to the wrist became inflamed and full of red blotches. Following this the swelling returned, and at the present time (June, 1918) the arm has been swollen for two months. She states that the swelling is nearly as marked now as before the operation.

Case 5.—A girl, aged 17, had a negative history until 1912. At that time the right leg became swollen without apparent cause, and remained so until she was seen here in November, 1917. No etiologic factor could be obtained. The patient had septic tonsils, which were removed after her operation. When examined there was a very marked enlargement of the right leg and thigh, with thickening of the skin. An operation of the Kondoléon type was done November 27, 1917. It was followed by marked improvement, which has been permanent to the present time (June, 1918).

Case 6.—A girl, aged 12, when 3½ years of age developed swelling on the inside of the right knee, which was followed by a swelling of the leg and thigh. The condition began one month after an attack of measles. She consulted us in February, 1918, at which time there was fairly marked swelling of the leg and thigh, with considerable thickening of the skin. She also had a tuberculous synovitis of the right knee-joint, with slight effusion into the joint, and a tuberculosis of the right inguinal glands. A Kondoléon operation was done February 12, 1918. This was followed by a very fair decrease in the

size of the limb, which has remained stationary to the present time (June, 1918). The result following the operation in this patient was not quite so good as that obtained in the other patients in whom the condition was present in the leg.

Case 7.—A woman, aged 21, five and one-half years before she was seen in the Mayo Clinic, in 1918, developed tonsillitis, which was followed by an arthritis with fever. At the same time there were several large boils on her face and right arm. Two and one-half years later the patient developed an amenorrhœa, and during six weeks' time lost 30 lb. in weight. She was then told by her physician that she was anæmic. The swelling in the right leg continued up to the date of her visit to this clinic, when there was a marked œdema of the right leg with considerable thickening of the skin. A Kondoléon operation was done on one side of the limb April 20, and on the other side April 30, 1918. It was followed by immediate and very marked improvement, which has continued up to the present time (two months). In this instance the limb returned practically to a normal state.

RHINOSPORIDIUM KINEALYI.[1]

By S. Chelliah, M.B. & C.M.Madras.
Assistant Pathologist, General Hospital, Colombo.

Rhinosporidium Kinealyi is a protozoan parasite, belonging to the class Sporozoa. On account of the spore formation commencing at an early period, and proceeding continuously, during the growth of of the trophozoite, Minchin and Fantham [1] place it in the sub-class Neosporidia.

Although the first mention of the parasite was made by Major F. O'Kinealy [2] in 1894, and communicated to the Laryngological Society, London, in 1903, yet the honour of a full description of the parasite was reserved for Minchin and Fantham in December, 1905. They had an opportunity to examine the sections of a nasal polypus, sent to Beattie [3] of Edinburgh in July, 1905, by Nair of Madras, who, in his practice as aural and nasal surgeon, had come across a number of polypi, which arose from the nasal septum, and which, on removal, were attended with very troublesome hæmorrhage, of patients coming from the Native State of Cochin, on the West Coast of India.

Although a large number of patients with intra-nasal growths has been from time to time admitted into the various surgical wards of the General Hospital, yet only recently, through the kind courtesy of Dr. A. M. De Silva, Surgeon, General Hospital, Aural and Nasal Surgeon, Victoria Memorial Eye Hospital, Colombo, I have had an opportunity to examine microscopically sections of these growths, in some of which at least the characteristic spores were identified.

Hence from to-day we may fairly well say that the parasite has its habitat, not only in Cochin State, India, but also in this small island of ours, Ceylon. Castellani and Chalmers [4] need no more say in their *Manual of Tropical Medicine* that "at present it is only known in India."

The following are a few cases:—

Case I.—M. A. ——, Moorman, aged 17, admitted with left intra-nasal polypus of about six months duration, complained of no pain, but had difficulty of breathing and a nasal twang on speaking.

Case II.—J. S. ——, Cingalese, aged 19, admitted with a growth in the right nares of a month's duration. No epistaxis, but complained of difficulty of breathing.

Case III.—K. ——, Moorman, aged 58, admitted with an intra-nasal growth of two months' duration, no pain, no epistaxis, but complained of difficulty of breathing.

In all these cases the growths were removed under chloroform.

The reason for reporting these cases is to show that Cases I and III, though Moormen, have never been to India; and the Case II is a Cingalese—he, too, has never been out of Ceylon. I have visited their houses and personally made inquiries on this point.

Macroscopical Appearances.—The growths were taken from some of the cases reported above. All present the same characteristic features. They are found to be vascular, fleshy, and pedunculated, attached to the anterior and upper part of the cartilaginous septum, varying in size and shape from a pea to a bean, freely movable, and painless. They are studded with minute yellowish white dots, which are quite visible to the naked eye and can be dissected out.

Microscopical Features.—The growth is covered by stratified epithelium, which shows here and there signs of proliferation. The cysts, which are oval, round, or irregular bodies, are usually found under the epithelium, where there is a stroma formed of delicate fibrous tissue. A fully developed cyst is lined with protoplasm, in which young pansporoblasts are forming, while the centre of the parasite is full of old spores, separated from one another by an indefinite framework, continuous with the capsule. The wall of the cyst is usually thin. The spores are set free by the rupture of the cyst wall, and may infiltrate the surrounding tissues or escape from the host in the nasal secretion.

I am obliged to Daniels and Alcock [5] for the following description of a young parasite:—

"The youngest parasites consist of granular protoplasm, enclosed by a hyaline membrane and containing numerous nuclei. As the parasite grows a thick capsule forms, and from the layer of cells in contact with this numerous other cells are formed and pushed towards the centre. The older cells increase in size and become multinuclear,

[1] From the *Journal of the Ceylon Branch of British Medical Association*, June 15, 1918.

and the protoplasm segments into numerous uninuclear pansporoblasts, which in their turn give rise to numerous spores."

The parasite has also been recorded by Beattie as occurring in aural polypi, also in Indians.

Though nothing is so far known as to the method in which infection is spread, yet I am confident that the time spent in investigating this parasite will not be vain.

REFERENCES.

[1] Minchin and Fantham: *Quarterly Journal of Microscopical Science*, London, 1905, vol. xlix.
[2] O'Kinealy: *Proceedings of Laryngological Society*, London, 1903, vol. x.
[3] Beattie: *Journal of Pathology and Bacteriology*, June, 1906.
[4] Castellani and Chalmers: "Manual of Tropical Medicine."
[5] Daniels and Alcock: "Tropical Medicine and Hygiene."

MEMORANDUM ON FOOD AND SCURVY.

By the Food (War) Committee of the Royal Society.

The Cause and Prevention of Scurvy.

(1) Scurvy, like beriberi, is a "deficiency disease," and is due to the long-continued consumption of food lacking in an accessory food substance or vitamine. The view that scurvy is due to tainted food must be abandoned.

(2) This vitamine is contained in a number of fresh foods: in largest amount in oranges, lemons, and fresh green vegetables; in considerable amount in roots and tubers, such as swedes, potatoes, &c.; and in small quantities in fresh meat and milk. It is deficient in all dried and preserved foods.

(3) It is destroyed by prolonged heating, such as takes place during stewing. Thus, potatoes in stews would be devoid of vitamine, but if boiled rapidly will still contain some quantity. Alkalies rapidly destroy antiscorbutic properties. Soda should therefore not be added to the water in which vegetables are soaked or boiled.

(4) Before the onset of definite symptoms of scurvy there is a period of debility and weakened resistance to disease. The occurrence of cases of debility in any body of troops without sufficient cause should at once direct the medical officer's attention to the sufficiency of the diet.

Prevention of Scurvy.

(5) West Indian lime juice, as ordinarily prepared, is useless for the prevention of scurvy. Fresh limes have an antiscorbutic action, but their efficiency is only one-fourth that of lemons. The so-called "lime juice" by the regular administration of which scurvy was eliminated from the Navy during the first half of the nineteenth century, was really lemon juice obtained from the Mediterranean. The history of Arctic exploration affords numerous examples in which scurvy was prevented for long periods of time by the agency of lemon juice regularly taken. Nares's expedition of 1875, notorious for the serious outbreaks of scurvy encountered, was the first to be provisioned with "lime juice" prepared from West Indian limes. Orange juice is as effective as lemon juice.

(6) Potatoes and root vegetables have a distinct value in the prevention of scurvy, much less, however, than green vegetables or fresh fruit juices. A daily ration of 14 oz. of potatoes, boiled rapidly but not stewed, will suffice to prevent scurvy.

(7) Pulses, beans, peas, and lentils in the dried condition have no antiscorbutic properties. If, however, the dried seeds are soaked in water and are allowed to germinate for a short period, one or two days, they develop the antiscorbutic vitamine. At the same time these pulses are also rich in the vitamine which prevents beriberi, and are, moreover, valuable foods.

The method adopted for germination is as follows: The beans, peas, or lentils are soaked in water at room temperature (60° F.) for twenty-four hours. The water is then drained away and, to permit germination, the soaked seeds are spread out in layers, not exceeding 2 in. to 3 in. in depth, and kept moist for a period of about forty-eight hours at ordinary room temperature (60° F.). They should not be allowed to dry after this operation, but should be cooked as rapidly as possible (lentils, twenty minutes; peas, forty to sixty minutes).

(8) The antiscorbutic value of fresh meat is very low in comparison with that of fresh vegetables and fruit. If fresh meat is consumed in large quantities, 2 lb. to 4 lb. a day, scurvy will be prevented. Tinned and preserved meat possess no antiscorbutic value. Frozen meat, while more valuable than preserved meat, must be considered inferior to freshly killed meat in this respect.

Methods of Cooking.

(9) The destruction of the antiscorbutic properties depends rather upon the time than the temperature employed. All foods, especially vegetables, should be cooked for as short a time as possible at boiling-point. Slow methods of cooking, such as stewing with meat or simmering below boiling-point, should be avoided. Potatoes should be plunged into boiling water and the boiling continued for twenty or thirty minutes after the boiling-point has again been reached. Frozen meat should be roasted when practicable.

The Memorandum closes with a summary of measures recommended for the prevention of scurvy when fresh vegetables are unobtainable; (*a*) The lime-juice ration should be replaced by lemon juice; the ration should be 1 oz. daily served with sugar. (*b*) Cooked germinated peas, beans, or lentils should form part of the regular daily ration. (*c*) Attention should be paid to the methods of cooking employed, as set forth under (9).

Colonial Medical Reports.—No. 75.—Saint Lucia.

MEDICAL REPORTS FOR THE YEAR 1915-16.

Victoria Hospital.

Sixty-seven patients remained in hospital at the end of 1914-15. One thousand and ninety-seven patients were admitted during the year, making a total of 1,164 in-patients treated. Of this number 576 were cured, 432 were relieved, 24 not improved, and 76 died, while 56 patients remained at March 31, 1916. The number treated showed an increase of 150 over the previous year, while the number of deaths was 23 less, the latter being, to a certain extent, due to the fact that fewer moribund cases were dumped at the hospital. Hospital treatment was provided for members of the Garrison, the St. Lucia Contingent, and labourers imported for work on the new roads. The class of patient seeking hospital treatment is steadily improving and is only limited by lack of suitable accommodation.

One hundred and ninety surgical operations were performed. In this series there were four deaths: three being elderly patients, who died of cardiac failure; and the fourth a boy, who died of tetanus contracted before operation.

The principal diseases treated were malaria, venereal diseases, ulcers, valvular heart diseases, and enlarged tonsils and adenoids. The number suffering from malaria was much larger than in the previous year, but the disease did not seem to be so virulent. Venereal disease is on the increase. The herculean task of tackling the problem of its treatment and prevention, sooner or later, awaits the Government, and it will require, among other things, the expenditure of a large amount of money and an increase in the medical staff.

The thirty-five children, who were operated on for enlarged tonsils and adenoids, show that parents are becoming alive to the injurious effect of this affection on the development of their children, and to the rapid improvement which generally follows operative treatment.

Twenty patients were admitted suffering from pneumonia, four of whom died, thus giving a mortality of 20 per cent. The virulence of this disease appears to alternate from year to year and not gradually lessen as one would expect. The percentage mortality figures for hospital cases for the past four years are respectively 50, 28·5, 43·4 and 20.

Six cases of climatic bubo were operated on, all being Europeans who had recently arrived in the Colony. The cause of this infection still remains unsettled, but the only satisfactory treatment is complete enucleation of the affected glands, the wound healing rapidly without leaving any of the troublesome sinuses which frequently follow less drastic treatment.

One hundred and thirty-four children were born in hospital during the year, which shows that the labouring women are taking more advantage of the maternity ward each year. During their stay in hospital the mothers are instructed in the care of the infant, with, it is hoped, advantageous results to the latter.

Alan Kidd, M.D., B.Ch.,
House Surgeon.

First District, Castries.

There was nothing of special interest to record during the period from October 15 to March 31, but during the months of November and December bronchitis was very prevalent. About the usual number of cases of malaria were treated, of these several were of a severe type. Intestinal parasites were, as usual, accountable for a large number of cases of illness, as were also gastro-intestinal disorders in infants, due to improper feeding.

Digby Macphail, M.B., C.M.

Second District, Castries.

Malaria, syphilis, tuberculosis and ankylostomiasis are still the prevalent diseases. Malaria was not more severe than usual; bad cases of ankylostomiasis are seldom seen now in this district; tuberculosis occurred in the usual numbers; venereal disease was, as usual, virulent. A useful demonstration of the damage wrought in this community by syphilis can be had any Saturday morning at 10 a.m., when the Relieving Officer issues his weekly dole. The proportion of recipients who have become a charge on the public obviously as the result of syphilis is very striking.

Rat destruction was carried out during eleven months of the year, 2,022 being captured. Twenty-five mongoose were caught incidentally and handed over to planters.

Coasting vessels were fumigated for the destruction of rats on twenty-one occasions, sulphur dioxide being employed.

For the prevention of malaria, surface drains were cut in several localities, notably the Riverside Cemetery, Bananues, and Bella Rosa. A concrete wall was erected at the Town Board's refuse pier to prevent the burrowing of rats, with good results. The drains in Four-à-Chaux were repaired and kept in good order. A new experiment was tried at a spot on the Reclamation land where there had always been a pile of rubbish. An ashpit was erected on a suitable concrete base with a good roof and sides to prevent tins, &c., filling with water. The people have taken kindly to the idea and the condition of the neighbourhood is much better for it. The system might be extended with advantage as funds permit.

RETURN OF DISEASES AND DEATHS IN 1915-16 IN THE FOLLOWING HOSPITALS, DISPENSARIES AND ASYLUMS:—

Hospitals.—Victoria, Soufrière, Yaws and Vieux-Fort.
Dispensaries.—Soufrière, Gros-Islet, Choiseul, Canaries, Laboire, Vieux-Fort, Dennery, Micoud and Ressource.
Asylums.—Pauper and Lunatic.

Saint Lucia.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	1	—	1
Anæmia	13	—	13
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	4	—	4
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	145	12	145
Delirium Tremens	1	—	1
Dengue	—	—	—
Diabetes Mellitus	2	—	2
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	26	—	26
Enteric Fever	7	2	7
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	2	—	2
Gonorrhœa	55	—	55
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	30	—	30
Kala-Azar	—	—	—
Leprosy	7	—	7
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	—	—	—
(*c*) Mixed	—	—	—
Malarial Fever—	2,144	8	2,144
(*a*) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	—	—	—
(*c*) Pernicious	—	—	—
(*d*) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	3	—	3
Malignant	6	1	6
Old Age	—	—	—
Other Diseases	620	—	620
Pellagra	6	1	6
Plague	—	—	—
Pyæmia	3	—	3
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	194	—	194
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	1	—	1
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	200	—	200
(*a*) Primary	—	—	—
(*b*) Secondary	35	6	35
(*c*) Tertiary	31	—	31
(*d*) Congenital	63	—	63
Tetanus	8	4	8
Trypanosoma Fever	—	—	—
Tubercle—	18	10	18
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—
GENERAL DISEASES—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	—	—	—
Yaws	848	1	848
Yellow Fever	—	—	—

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	126	3	126
Circulatory System	70	—	70
(*a*) Valvular Disease of Heart	25	13	25
(*b*) Other Diseases	6	—	6
Digestive System—	716	—	716
(*a*) Diarrhœa	—	—	—
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	—	—	—
Congestion of Liver	—	—	—
(*d*) Abscess of Liver	—	—	—
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	—	—	—
(*g*) Cirrhosis of Liver	1	—	1
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	24	—	24
Ear	29	—	29
Eye	48	1	48
Generative System—	—	—	—
Male Organs	61	—	61
Female Organs	123	2	123
Lymphatic System	51	—	51
Mental Diseases	20	11	20
Nervous System	198	4	198
Nose	18	—	18
Organs of Locomotion	8	—	8
Respiratory System	293	9	293
Skin—	158	2	158
(*a*) Scabies	—	—	—
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	—	—	—
(*f*) Other Diseases	—	—	—
Urinary System	168	5	168
Injuries, General, Local—	149	7	149
(*a*) Sirisis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(*c*) Other Injuries	4	—	4
Parasites—	—	—	—
Ascaris lumbricoides	1,535	—	1,535
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	98	3	98
Filaria sanguedinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	187	4	187
Amputations, Major	—	—	—
,, Minor	64	—	64
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	3	—	3

The Sanitary Inspector made his usual visits of inspection in Castries, and in the months of August and September made a tour of the coast villages in addition.

Fifteen houses were sprayed with disinfectant after cases of pulmonary tuberculosis or pneumonia had occurred.

ALEX. KING, M.B., Ch.B., D.P.H.

FOURTH DISTRICT, SOUFRIERE, SAINT LUCIA.

Soufrière Casualty Hospital.

There were fifteen admissions during the year with two deaths, one from enteric fever and the other from nephritis. There were no patients in hospital at the end of March, 1916.

Pauper Asylum.

There were 71 inmates in the asylum at the beginning of the year, and 42 cases were admitted, making a total of 113, which is the same as last year. There were 19 deaths, which is not high, having regard to the nature of the institution and the type of patients admitted. There were 70 inmates in the asylum at the end of the year.

Yaws Hospital.

Fifty-four patients remained in hospital at the end of last year. There were 430 admissions, making a total of 484 for the year, as against 454 last year.

There was one death from tetanus which developed on the second day after admission. The patient had not been injected. Four hundred and forty-three cases were treated with "arseno-benzol" during the year, as against 337 last year. The intramuscular method was the only one employed.

Up to the end of the year 1,188 cases have been injected, exclusive of re-injections, and there have been 63 re-admissions as recurrences, or a little over 5 per cent. In nearly every instance more than twelve months, and as many as thirty-six months, have elapsed between discharge and re-admission, so that the cases should really be classified as re-infections. The majority of these cases of recurrence are old chronic ulcers, the slightest injury to the very thin covering tissue causing them to break down again. "Arseno-benzol" was used from May 26 to February 7, when "Kharsivan" was supplied.

At the end of the year there were six lepers in the institution. These cases are now housed apart in two small huts built on the grounds for males and females respectively, and capable of accommodating six males and four females.

Dispensaries.

1,232, 687 and 686 patients presented themselves for treatment at the Soufrière, Choiseul and Canaries Dispensaries respectively, as against 1,046, 462 and 651 last year. These numbers do not include repeats. It is noticeable that at Choiseul 91 cases of yaws came forward for admission to the Yaws Hospital, as against 11 last year. These cases are nearly all from the heights, and is further testimony that the public appreciate the present method of treatment and are coming forward voluntarily. It is to be regretted that we cannot cope with all the cases at the same time.

Lists are kept and a certain limited number sent in for admission every week depending on the number at the Yaws Hospital. Soufrière and Canaries also show an increase. The cases awaiting admission are, in my district, kept continuously on a mixture of pot. iodide and mercury.

161 successful vaccinations were performed at Soufrière, 121 at Choiseul, and 59 at Canaries.

General.

The year just closed was a comparatively healthy one. There was the usual increase in the death-rate during the last quarter of the year and chiefly among the aged. One or two sporadic cases of enteric fever were met with in Soufrière.

A qualified and registered midwife is now attached to the Soufrière Casualty Hospital whose services are at the disposal of the public. This has met a long-felt want, and will, I hope, tend to diminish infantile mortality. It will be a little while before the people get schooled into requisitioning her services, but I am hopeful that time will remedy this and that it may be possible to gradually appoint qualified midwives to all the villages.

A spleen and liver census was taken of all the primary schools in my district.

A. F. HUGHES, M.B., Ch.B.

FIFTH DISTRICT, VIEUX-FORT.

Vieux-Fort Hospital.

There remained at the beginning of the year 1915-16 two male patients. Twenty-three patients were admitted into hospital during the year—seventeen male, and six female patients; and two male patients remained in hospital at the end of the year 1915-16.

Of the diseases treated during the year, there were three cases of tetanus, with one death; one case of lead poisoning, with acute alcoholism, sent to Soufrière Asylum; three of debility; one of disease of the visual organs; one of disease of the urinary system; two of the female and one of the male generative organs; one of the organs of locomotion; one of the cellular tissue; six of wounds and bruises; and one of an infant in arms with its mother.

Laborie Dispensary.

Four hundred and forty patients applied for treatment and medicines at the above dispensary. As usual, fevers 180, worms 71, diseases of the diges-

tive 72, and of the respiratory organs 18, head the list.

During the year there was at the beginning of it an epidemic of dengue, or dandy fever; and at the end, what may be called, an epidemic also, of fever and fits, among the infant population.

For the latter, the usual hot bath and purgative did much to control its severity, and there were very few deaths, as compared with the number of cases seen.

The number of vaccinations performed at this dispensary during the year 1915-16 was 80.

Vieux-Fort Dispensary.

One thousand three hundred and sixty-five patients applied for treatment and medicines at the above dispensary.

Fevers headed the list, "facile princeps," and this was due to the same epidemic of dengue at the beginning, and fevers and fits among the infant population at the end of the year.

Diseases of the respiratory system 62, digestive organs 101, worms 29, and anæmia and debility 27, were among those principally treated, besides fevers 871 cases.

The number of vaccinations performed during 1915-16 were 108.

Except for the epidemic of dengue, and fevers and fits, the health of the district was fairly good for the year. There was no abnormal number of deaths to record, and the epidemics, though widespread, were very mild, and not such as to call for special notice.

There was one very abnormal circumstance, however, obtaining in the district during the year, and that was the abnormal state of the weather; there was no rainy season, the whole year it rained off and on, and I believe that that was the cause of the unusual amount of fevers in the district, and especially among the infant population.

The district is still in want of a water supply, the want of which is the primary cause of most of the unhealthiness in the district. I believe to this we may ascribe the amount of ankylostomiasis and other allied verminous diseases among the people.

I had, in season and out of season, pointed to this state of things, and I cannot go on much longer, so the least said about it the better.

J. A. Lestrade, M.B., C.M.Edin.

Sixth District, Dennery.

A great boon has been conferred upon the inhabitants of Micoud and district by the ready and favourable response of His Honour the Administrator to their petition in having the Micoud Dispensary supplied with drugs, so that they may have their prescriptions compounded without having to proceed to Dennery for that purpose as was formerly the case. His Honour further made provision to enable the Dispenser to accompany the Medical Officer on his weekly visit. The hardship and difficulties, especially in the rainy season, which the people experienced to obtain medicine have been removed; and the numbers now attending at the dispensary, not only from the Sixth District proper, but also from the adjoining part of the Fifth, is sufficient and gratifying evidence of their gratitude and appreciation.

The sanitary condition of the district was fairly good, but the number of cases of malarial fever and worms shows no diminution.

New streets have been constructed in Micoud, and the drainage of the village received constant attention.

There were only two cases of injury of much severity—in the one, a boy had his foot crushed by a truck at La Ressource, and died in the Victoria Hospital after amputation of the foot; in the other, an adult had his right ear lacerated and partially removed as a result of the overturning of a cart.

A few cases of venereal disease were seen and treated, but the applicants presented themselves only after a prolonged course of bush remedies and when the condition was going from bad to worse. This recourse to the "bushman" seems innate in this class of native, but I look forward with sympathy and confidence to a brighter future for the next generation, since the resources of civilization and education are not yet exhausted.

Owing doubtless to the War and the irregular and disorganized mail service the supply of vaccine lymph was not constant and hence a fall in the number of vaccinations performed.

The revenue obtained from paid prescriptions, which are out-numbered by the free, was £51 11s. 6d.

The number of deaths certified was 132, the casualty being heaviest among children and the aged.

The following figures represent the number of vaccinations performed in the respective dispensaries: Dennery, 47; Micoud, 79; Ressource, 70; total, 196.

J. T. de Coteau, M.R.C.S.Eng., L.R.C.P.Lond.

Toc Lunatic Asylum.

Seventy-eight patients remained in the asylum on March 31, 1915. Thirteen males and 7 females were admitted, 12 males and 4 females were discharged, and 7 males and 4 females died during the year. Of the 16 patients who were discharged, 6 were considered cured, 9 were relieved, while one female, who was not improved, was transferred to Barbados Asylum. The daily average number of patients was 76, and the number remaining in the asylum on March 31, 1916, was 71.

About half of the patients are usefully employed in household work, agriculture, and gardening. The waste slopes surrounding the asylum were cleared of bush, and vegetables planted by the male inmates. This clearance added to the appearance and healthiness of the place, and vegetables to the value of £14 were raised during the year.

Colonial Medical Reports.—No. 75.—Saint Lucia (*continued*).

Several enterprising but harmless patients escaped during the year, but were soon brought back. The possible avenues of escape from the buildings and airing courts are gradually being blocked as the ingenuity of the patients reveals them.

As much freedom, however, from obvious surveillance as their condition warrants is given to the patients, with the result that the majority are contented with their lot. Only one patient has had to be mechanically restrained to prevent self-injury, and the number requiring seclusion at various times is diminishing fairly rapidly.

ALAN KIDD, M.D., B.Ch.

Colonial Medical Reports.—No. 76.—British Guiana.

MEDICAL REPORT FOR THE NINE MONTHS, APRIL TO DECEMBER, 1915.

By K. S. WISE,

Surgeon General.

HOSPITALS.

THE number of patients in each hospital has in general decreased during the last few years in accordance with the generally improved health of the colony. The wave of increased sickness and mortality which passed over the colony during the latter six months has slightly increased the number of in- and out-patients. The average for the previous five years is 15,272 and 61,211, while for this year the number are, for nine months, 9,187 and 27,885.

It is probable that many patients who present pauper certificates are quite able to pay the small sum required by the poverty certificate. This applies much more to those of the East Indian race than to any other, and is probably due considerably to misunderstanding. The East Indian immigrant finds free hospital treatment offered to him on the estates, and it is difficult for him to readjust his ideas and realize that the conditions are different elsewhere. Those presenting pauper certificates not infrequently deposit money when advised that admission to the hospital is necessary and a deposit required.

Phthisis, pneumonia, Bright's disease, enteric fever and dysentery as usual show the highest mortality in the diseases and deaths for the year.

The special isolation block at the Public Hospital, Georgetown, has been much more freely used during the year for the isolation of enteric fever. The total number admitted for this disease from January to December, 1915, was 184 with 35 deaths. Those dying were fewer this year, in spite of the much increased number of admissions for enteric fever.

A special ward in the Public Hospital at New Amsterdam is reserved for enteric fever alone.

The percentage of deaths to admissions for pneumonia is regrettably high, being for the year at the Georgetown Hospital 61·1. In previous years it has varied between 37·9 and 60·4 per cent. Almost half those patients that died were brought to the hospital within seventy-two hours of their death, brought at a time when the least movement should be avoided, and at a time when medical aid comes too late.

In the Georgetown Hospital the percentage of deaths to cases treated in the case of enteric fever this year is 19; previous years have varied from 22·6 to 36·2 per cent.

The general death-rate for the Georgetown Hospital from 1880 to present date shows that during the nine months under review 6,393 in-patients came under treatment with 698 deaths, giving a percentage of 10·9.

The Probationers' Home has been full throughout the year, and the nurse superintendent reports no difficulty in filling vacancies.

The training schools at both Georgetown and New Amsterdam have continued good work: thirteen probationers were examined and twelve passed, three of these being from the hospital in New Amsterdam. Similarly twenty-four midwives presented themselves after the eight-months' course, and sixteen qualified and were registered. Since 1906 154 midwives have been trained and registered.

Students are trained at these hospitals as chemists and druggists, and also as sick nurses and dispensers.

These courses of training at the hospitals are one of the most valuable and important parts of the work at the hospitals, since there is urgent need both in villages and towns for a better class of trained dispenser, nurse and midwife than has existed in the past.

The hospitals at Georgetown and New Amsterdam are supplied with maternity wards, and I regret that the plan for adding such a much-needed ward to the hospital at Suddie is still postponed. During the nine months there were 425 deliveries at Georgetown and 86 at New Amsterdam, while 10 took place at Suddie.

There is an outdoor midwifery department attached to the Public Hospital, Georgetown. During the nine months 156 deliveries took place under the care of these midwives without a single death.

All the hospitals have been visited periodically

RETURN OF DISEASES AND DEATHS FROM APRIL 1 TO DECEMBER 31, 1915, IN THE VARIOUS HOSPITALS AND ASYLUMS OF

British Guiana.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	13	—	13
Anæmia	65	—	65
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	4	2	4
Chicken-pox	5	—	5
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	107	27	107
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	4	1	4
Diabetes Insipidus	7	2	7
Diphtheria	12	6	12
Dysentery	297	75	297
Enteric Fever	154	32	154
Erysipelas	—	—	—
Febricula	10	—	10
Filariasis	—	—	—
Gonorrhœa	118	1	118
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	24	—	24
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	27	1	27
(*c*) Mixed	—	1	—
Malarial Fever—	9	3	9
(*a*) Intermittent	814	23	814
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	33	6	33
(*c*) Pernicious	35	12	35
(*d*) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	34	—	34
Malignant	38	8	38
Old Age	7	1	7
Other Diseases	6	—	6
Pellagra	14	5	14
Plague	—	—	—
Pyæmia	8	6	8
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	92	—	92
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	22	19	22
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	3	1	3
(*a*) Primary	6	—	6
(*b*) Secondary	56	2	56
(*c*) Tertiary	49	5	49
(*d*) Congenital	20	10	20
Tetanus	13	8	13
Trypanosoma Fever	—	—	—
Tubercle—	15	11	15
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—
GENERAL DISEASES—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping Cough	4	—	4
Yaws	25	—	25
Yellow Fever	—	—	—

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	468	23	468
Circulatory System	137	36	137
(*a*) Valvular Disease of Heart	—	—	—
(*b*) Other Diseases	—	—	—
Digestive System—	—	—	—
(*a*) Diarrhœa	269	34	269
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	11	1	11
Congestion of Liver	4	—	4
(*d*) Abscess of Liver	14	5	14
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	12	1	12
(*g*) Cirrhosis of Liver	46	16	46
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	593	86	593
Ear	18	—	18
Eye	186	—	186
Generative System—	—	—	—
Male Organs	216	2	216
Female Organs	1,435	47	1,435
Lymphatic System	100	—	100
Mental Diseases	100	—	100
Nervous System	160	23	160
Nose	7	—	7
Organs of Locomotion	126	1	126
Respiratory System	781	232	781
Skin—	—	—	—
(*a*) Scabies	17	—	17
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	7	—	7
(*f*) Other Diseases	332	3	332
Urinary System	459	144	459
Injuries, General, Local—	479	15	479
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(*c*) Other Injuries	—	—	—
Parasites—	11	—	11
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	183	33	183
Filaria medinensis (Guinea-worm)	164	17	164
Tape-worm	—	—	—
Poisons—	20	3	20
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	3,004	23	3,004
Amputations, Major	—	—	—
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	—	—	—

including those at Morawhanna and Arakaka in the North Western District. These were always found clean and tidy, and the buildings well kept and the grounds in order.

The Resident Surgeon, Public Hospital, Suddie, records: "The drainage is most unsatisfactory; in fact, there is no drainage system whatever. The two kokers which were put in to drain Suddie are normally buried under about 10 ft. of sand, and only when the rainfall is heavy and the grounds flooded for several days are attempts made to clear away the obstruction and allow the surface water to drain off. The excess water in the main trenches and drains are usually got rid of by evaporation and soakage."

At the Public Hospital, Bartica, the heavy secondary bush growth growing right up against the hospital has been cleared away and burnt, much improving the surroundings. Both the Morawhanna Public Hospital and the Arakaka Ward underwent extensive structural repairs.

Asylums.

Lunatic Asylums.

I visited the institution on three occasions and always found it in excellent order. The buildings are well kept, the grounds trim and neat, the patients clean and well attended.

An exceptional number of criminal lunatics were transferred from H.M. Penal Settlement to this asylum during the nine months, and amongst others two specially dangerous ones. These two escaped on the night of September 15, 1915; both were recaptured; one was at large for forty-eight hours, and the other for fifty days.

The average number of inmates has decreased by four for this year, falling from 770 to 766. The death-rate is 8·7 per cent., which is very satisfactory for an institution of this character.

Leper Asylum.

Since 1911 there has been a general tendency in the average numbers in the asylum to decrease. The decrease in 1915 has been greater than at any other period, the average number of inmates falling from 373 to 332, the lowest being in December, 314. This is due to the gradual discharge of many of the older inmates who were in no way infectious to others, and in whom the disease had long ago died out. Thirteen were thus discharged during the period under review unconditionally, and nine others under supervision of the Government medical officer of the district.

The accommodation has been ample, and both on the male and on the female side a special building has been set apart for those admitted in whom there is doubt as to the presence of active leprosy. It is difficult, however, to prevent the mixing of these with the general inmates, and the necessity for definitely fenced-in isolation blocks is more and more evident.

Absconding has decreased, as this table shows:—

	Males	Females
1912-13	18	0
1913-14	15	1
1914-15	19	0
1915 (9 months)	8	0

Of these six were recaptured by the police, one by the attendants, and one is still at large.

Religious services and school attendance have been carried on as usual, and I am glad to record that His Lordship the Bishop of Guiana has been able to arrange regular services for the inmates of the Anglican Church.

Industrial occupation has again been the keen delight of the inmates, who have completed the painting of the tailor and shoemaking shops, the dining hall, and four cottages. The store was also painted, but in this case by a contractor.

The farm has been visited on several occasions by the District Officer of the Board of Agriculture, and showed much promise in the early part of the year. Unfortunately the continuous dry weather greatly diminished the yield of the crop.

The general conduct and demeanour of the inmates continue at a satisfactory standard.

The mortality continues low, being twenty-two deaths during the nine months, equivalent to 8·7 per cent. per annum. Fifty-nine per cent. of the twenty-two deaths were directly due to leprous lesions, while 41 per cent. were directly due to general diseases, such as tuberculosis, Bright's disease, malaria, &c.

In-patients at the hospital amounted to 233 and the out-patients to 427. Twelve minor operations were necessary.

No births took place during this year.

The water supply is unsatisfactory, and in the long dry spell in this year it became necessary to bring water from Springhall Estate. A deep artesian well has been asked for, and it is hoped to see it completed during 1916.

Public Dispensaries.

In Georgetown there are two dispensaries; and there are five country dispensaries.

The dispensers in charge are provided with boats for the purpose of paying periodical visits to the different grants, homesteads and missions.

Free medicine were supplied to the following: Caria Caria, Chalk Hill, Coomaeka, Fort Island, Orealla, Rupununi, St. Mary, Sand Hills, Saxaealli, Takatu, Tumatumari.

Prison Hospitals.

In the prison of Georgetown and New Amsterdam the sickness has again been at a low rate, and the hospital at New Amsterdam prison was empty on 165 days during the nine months. Quinine still continues to be given regularly to all prisoners.

At H.M. Penal Settlement the reduction of sickness and improvement of health still continue. The

admissions to hospital again are less, being forty-seven in nine months.

The almost total absence of malaria is noticeable, and is due to the constant attention to sanitary details insisted upon by the medical officer.

An increase in alimentary disease is due to an outbreak of dysentery (eighteen cases amongst the prisoners, with one death and nine cases amongst others with no death) in December, following a marked increase in the number of flies. The necessary measures have since been adopted—flies are again absent and dysentery no longer present.

For 106 days the hospital was empty.

The Onderneeming Industrial School for Boys.

The average daily number of boys was 121·8; the percentage of sick to this daily average was 4·59. The prophylactic use of quinine has produced a marked improvement in the incidence of malarial fever, there being only six cases, which were all mild ones, treated in hospital for the nine months of 1915.

An outbreak of chicken-pox started in March, 1915, and eventually spread to forty-one of the boys. None were seriously ill or suffered from after-effects. They were duly isolated and treated in the infirmary ward of the institution. One case of enteric fever occurred, the source of which could not be traced.

A deep artesian well was sunk in the grounds during this year and is flowing freely.

House-flies are reported to be unduly prevalent, and steps are being taken to prevent this.

Alms House and Orphan Asylum.

Alms House.

The average number of inmates was 778. The total number treated was 2,349. The death-rate was 22·7 per cent.

During the last six months of 1915 there has been a general increase in the number of admissions to the Alms House, in the number of persons suffering from intestinal disorders, and in the number of persons dying in the institution.

The following table submitted by the Medical Officer, Dr. Robertson, illustrates this change:—

Total general admissions	1,600
Total intestinal diseases treated	338
Total deaths—all causes	535

This change coincides with a similar increase in the number of patients admitted into the Public Hospital, and also corresponds with a general increase in deaths from intestinal complaints in every part of the whole colony. The number of deaths from such causes in the whole colony for the latter six months of 1914 was 351, while in 1915 it was 582. Similarly in the Georgetown district the deaths during these periods were 54 and 97 respectively.

I visited the institution on several occasions at the request of the Chairman of the Poor Law Commissioners, and in order to cope with the changed conditions the Chairman arranged for three extra infirmary wards, making five instead of two, with accommodation for 277 infirmary patients instead of 110. As a result 2,137 persons have come under treatment in nine months, against 1,491 in the whole year 1914-15.

The principal diseases treated were of a chronic nature, chiefly consisting of chronic Bright's disease, dysentery, diarrhœa, septicæmia, syphilis, and phthisis.

The clothes of the dysentery and diarrhœa patients received special care, being thoroughly soaked in disinfectant and then boiled before being washed in the laundry.

Overcrowding of the inmates naturally resulted from the increased applications for admission, and it was necessary to provide immediate relief for such a serious condition. Enclosure of some of the galleries gave the necessary increase of sleeping accommodation, but this arrangement is only adopted to arrange for what is believed to be a temporary condition. Increased attendants were supplied to deal with the serious ulcers, and the whole method of treatment reorganized and amplified.

The prompt adoption of these measures is now gradually showing their effect, and the number of deaths in January was 81, in February 61, and in March 60.

Orphan Asylum.

The daily average in this institution was 77, viz., boys 55, and girls 22. With the exception of extensive filarial infection the general health was good, and what sickness did appear was usually of a trivial nature.

General Health.

The general health of the colony during the year 1915 continued good during the first six months, but in the latter half of the year was less satisfactory. In the first half of the year there were 4,982 births and 4,016 deaths, while in the latter half 4,784 births and 4,621 deaths, a decrease of nearly 200 births, and an increase of over 600 deaths.

The population on December 31, 1915, was estimated at 312,391, being an increase of 2,453 over last year. Of this increase 1,129 is due to excess of births over deaths, and 1,324 to excess of immigration over emigration.

The birth-rate is 31·3, against 34·4 for 1914. This difference is very marked, and the actual decrease in the number of births is 896 (9,766, against 10,662 for 1914), and occurs in every part of the colony. The number of births in any quarter is influenced largely by the amount of sickness and mortality six to nine months previous; thus the greatest number of births in 1915 were in January and October quarters, quarters both preceded at that interval by quarters of low mortality, and similarly the April and July quarters with lower birth-rate were preceded by quarters of higher mortality.

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The death-rate for 1915 is 27·7, against 24·5 in 1914. The actual increase in the number of deaths is 1,051 (8,637, against 7,586 in 1914), and is an increase that is equally distributed over the colony and not limited to any special area. This increase occurs particularly in the latter half of the year, and is due to a considerable increase (about 40 per cent. in each case) of deaths from malaria and from intestinal disorders.

Throughout the medical history of the colony, since as far back as 1870 the prevalence of malaria and intestinal disease has dominated the statistical picture. When either of these diseases is at a minimum the death-rate is average, and when both are at a minimum the death-rate is very low. When it is realized that a low death-rate results in a high birth-rate in the succeeding quarters, it is apparent that in the secret of the control of these two diseases lies much of the health of the future. In general the combined mortality from these two causes comprises from a quarter to a third of the total mortality of the colony year by year.

The mortality of infants, an important indication of the general sanitary condition in any country, continues at a low level, though the rate is somewhat increased, viz., 170 in 1914 to 184 in 1915. The actual number of infant deaths is less—1,799 in 1915 and 1,811 in 1914, but the number of births was considerably less.

There has been no case of cholera, yellow fever, plague or small-pox during the year. The last outbreak of small-pox was in 1904 and of yellow fever in 1885. There has been no case of plague or cholera in the last forty years.

Urban Districts.

The City of Georgetown in common with the rest of the colony suffered from a decrease in the birth-rate. In this case, however, the decrease is considerable, being 177 (from 1,641 in 1914 to 1,464 in 1915), or a decrease of over 10 per cent.

There has been a slight increase in the number of deaths from 1,512 in 1914 to 1,545 in 1915, and it is thus clear that, though the deaths this year exceed the births, this is due not to increased mortality, but to a decreased birth-rate. Thus the birth-rate has fallen from 30·8 in 1914 to 27·4, while the death-rate is maintained at 28·9 (28·3 in 1914).

Similarly the actual number of deaths from infants is less than last year, viz., 334 against 345, but owing to the reduced number of births the rate increases from 210 in 1914 to 228 in 1915.

The number of notifications of enteric fever is increased from 154 in 1914 to 192 in 1915, but the actual number of deaths reduced from 45 to 40; this reduction is due largely to the increased use of the isolation ward at the hospital in an earlier stage of the disease.

The number of deaths from tuberculosis is much reduced, and the number of deaths for the last two years (178 in 1914 and 150 in 1915) emphasizes better than anything else the excellent work of the British Guiana Society for Prevention and Treatment of Tuberculosis.

This city still relies upon drinking water collected in vats from roof collecting areas. This water is known to be of a very inferior quality from pollution on the roofs, and it is therefore perhaps not surprising that in 1914 between one-sixth and one-seventh of the deaths in the city are ascribed to dysentery and diarrhœa.

The discovery of abundant artesian water of good quality under the city places Georgetown in a position to obtain an excellent pipe supply of drinking water, and will enable the numerous vats to be abolished and the inhabitants to be relieved of the heavy expense of this upkeep.

The town of New Amsterdam, as elsewhere in the colony, shows a decrease in births (295 to 280) and an increase in deaths (223 to 237). The increased deaths mainly occur under the head malaria, which has more than doubled in number (28 in 1915 and 13 in 1914). There is an increase in infant mortality, but even with this increase the rate (150 per 1,000 births) is much below the general rate of the colony (184 per 1,000 births).

There were no deaths from enteric fever during 1915 in New Amsterdam.

Village Areas.

Improvement in these extensive village and country areas is bound to be slow, and the condition year after year will seem to remain much the same. As before, lack of yard drains, presence of low bush and unnecessary vegetation leading to dark, moist and airless surroundings, irregular mosquito breeding pools, unscreened barrels and absence of privy accommodation represent some of the removable evils.

The customary water supply is of the most primitive character, is of bad quality, and at times lacking in quantity. Ponds and trenches fed by rain or surface peaty water led through canals for many miles, and freely open to surface pollution in most cases, serve as the only supply. Not a single village has a supply that would conform to modern requirements. Dr. Gewand in the Skeldon District reports "the quality of water consumed by the villagers at times is simply atrocious." Medical officers universally condemn these inadequate supplies, and petitions for the provision of deep artesian wells are frequent. It is little wonder that intestinal diseases have in the past caused numerous deaths, incalculable sickness and irreparable loss.

Deep artesian wells have now been sunk. Unfortunately the water has a small percentage of iron which readily oxidizes out and deposits either as a yellowish pellicle or sediment, and requires preliminary treatment with polarite, &c., to make it completely satisfactory. Fortunately this treatment is easily carried out in simple and readily constructed apparatus.

The diseases specially common were malarial fever and intestinal disorders. Dr. Gewand at Skeldon reports "during the early part of the second half-year an epidemic of malarial fever has taken place over the whole district. This was followed by a large number of cases of intestinal disorders, principally dysentery."

Dr. MacAdam at Mahaicony reports: "Malaria fever is the prevailing disease, and diarrhœa accounts for many deaths among both old and young."

Dr. Von Winckler in the Buxton district records "Malarial fever has been very prevalent, especially in Golden Grove and Victoria villages."

Dr. Mitchell in the Peter's Hall district describes "Dysentery was very prevalent during part of the year, particularly in the villages of Mocha and Arcadia."

Dr. Neal from the Leonora district states: "The prevailing disease was malaria, and, as can be imagined, children suffered greatly, and the mortality among them owing to the frequency of convulsions as a complication, more than in adults.

"Parents seem indifferent to fever, and it is only when convulsions begin they become alarmed and often too late."

In certain districts it is represented that the neighbouring river areas which are now in many cases being reclaimed from forest are very unhealthy, and the sickly and dying people, as is natural, seek the nearest medical assistance. Dr. Gewand in the Skeldon district reports: "People from other parts, especially from up the river, for instance, New Calcutta, Tiger Creek, Crabwood and Johnson Creeks, Warleigh, &c., where there are large numbers of time-expired immigrants occupied in rice cultivation, when they are sick are usually coming down here to stay with friends or relatives on the estates or in the villages, and I regret to say that many cases come down either moribund or in such advanced state of sickness that their chances of recovery were very remote, and the deaths having taken place here, they were naturally registered *in loco*."

Similarly Dr. Wills in the Mahaica district records: "It must be also stated that a large number of the free people is constantly moving up and down between the estate and the rice lands in the creek, and it is these people who, after residence in the creek for some time, return to the estate saturated and debilitated with malaria to swell the number of malarial cases."

In the Peter's Hall district the International Health Commission has completed the universal and free examination and treatment for hookworm disease, and during this year carried out a similar campaign in the Belle Vue district, which was completed on December 31, 1915. Dr. Boase of the Belle Vue district states: "During the year the Rockefeller Institution prosecuted a campaign against the hookworm, the result of which was of decided benefit to the population."

Similarly the Government Public Health Department were at work, and Dr. Boase records that the sanitary condition of the villages has shown a decided improvement. Whereas formerly many of these areas were without privy accommodation, some 1,400 new ones have now been erected.

The Baby-saving League has also carried on work in the Peter's Hall, Belle Vue and Buxton districts.

Dr. Teixeira in the Anna Regina district states: "Convulsions in children have accounted for a fair number of deaths and malarial fever continues to prevail. And no doubt the thick bush to be seen everywhere must account largely for all this.

"No air seems to get into the usual low huts the people live in, the thick under bush along the coast acts like a stone wall, and these huts are close and stuffy, and the people often carry this further by closing their windows and stuffing crevices with bits of cloth when there is sickness. I saw this not long ago in a case of pneumonia when not satisfied with making the room a black-hole, the poor patient was surrounded with hot-water jugs (to make her sweat). On my previous visit she had passed the crisis—now she was doomed."

Sugar Estates.

The sugar estates present a great contrast in sanitary conditions when compared with the villages. One finds well-drained yards, a great reduction in mosquito breeding-places, removal of thick bush, and the universal provision of latrines.

The actual number of births on the estates (including persons from estates dying in the public hospitals) during 1915 was 2,213 (2,463 in 1914) and of deaths 1,392 (1,263 in 1914). There was thus a natural increase of 821 persons on the estates population of 65,074. As the total natural increase in the colony was 1,129 persons on the population of 312,391, it is clear that the natural increase off the estates is anything but satisfactory and not to be regarded with equanimity.

The prevalent diseases were much the same as in the villages.

At Plantation Skeldon and Springlands, Dr. Gewand reports a considerable increase in sickness and deaths from malarial fever and dysentery during the latter six months of the year. At Port Mourant bronchial diseases are specially recorded. In the Canje district, on Rose Hall estate, Dr. Barnes recorded an epidemic of malaria, during which a few cases of blackwater fever made their appearance. Pneumonia is recorded as less common. Dr. Barnes continued the use of quassia as a vermifuge in ankylostomiasis, and states that "the result has been excellent." His methods are being used by other medical officers, but so far without much success.

At Mara, Dr. Burton found pneumonia very fatal. There were also three cases of enteric fever with one death. A small outbreak of dysentery occurred at Ma Retraite.

At Bath there was a severe outbreak of enteritis,

which Dr. Irving reports as especially affecting children.

At Non Pareil and Lusignan there were cases of enteric fever appearing, and Dr. Von Winckler performed over 680 anti-typhoid inoculations of contacts, &c., and thereby checked any increase of this disease.

At Farm dysentery was epidemic, and enteric fever accounted for five cases and one death. Similarly at Providence a serious outbreak of enteric fever occurred in June, July and August, resulting in thirty-six cases and three deaths. Extensive inoculation was done amongst the contacts, and the disease is now but rarely reported from this district.

In the Peter's Hall district oil of chenopodium has been used by Dr. Ferguson as a vermifuge in ankylostomiasis, and Dr. Mitchell reports good results.

Marionville estate was also visited by enteric fever, recording eight cases and three deaths.

The estates have three categories of labour population; first, those who live in the indentured yard; second, those who live in the free yard; third, those who live in the pasture lands. On most estates the indentured and free yards are kept in a satisfactory sanitary condition. Unfortunately the condition of the pasture lands is anything but satisfactory, consisting mainly of abandoned sugar-cane cultivation, alternating rows of dry land and swamp land. Land of this sort undoubtedly requires some preparation in the direction of levelling and drainage before it is fit for occupation—that is, occupation accompanied with health.

Dr. Neal rightly states: "In contrast to the well-kept yards is the condition of the pasture lands of the estate where East Indians settle largely, and over whom little or no control is exercised. Here is one direction where some system of town planning would be beneficial." Other medical officers have made similar recommendations, and I cannot help thinking that in failing to prepare a suitable site and impose some reasonable restrictions for such settlers the estates defeat in part their wish to obtain in this way a satisfactory labour force. There is undue sickness and mortality in such settlements.

Enteric Fever.

This year there has been an increased number of notifications since February 24, 1912, when notification became compulsory.

The number of deaths from this disease has been reduced. In this connection it should be noted that a much larger number of cases have been admitted and treated in the special isolation hospital at the Public Hospital, Georgetown, with very gratifying results, the case mortality being much less than in previous years. There were treated in this hospital 184 cases with 35 deaths in the year 1915, against 151 cases with 51 deaths in the year 1914.

The following table shows the number of deaths from this disease each year:—

	Deaths per year in the whole colony
1886-90	7
1891-95	10
1896-1900	10
1901-05	4
1906-10	28
1911	76
1912	93
1913	106
1914	100
1915	75

The deaths from enteric fever in the City of Georgetown were 45 in 1914 and 40 in 1915.

The distribution of notifications and deaths during 1915 is as follows:—

Area	Notifications	Deaths
City, Georgetown	192	40
Town, New Amsterdam	7	0
East Bank, Demerara	100	13
East Coast, ,, ...	67	9
Rest, Demerara	20	4
County, Berbice	16	2
County, Essequebo	17	7

Many vehicles of the infection no doubt at times play a part in the spread of this disease in British Guiana, but the social condition and habits of the people are so favourable to spread by personal contact that little doubt can be entertained as to the great influence of this method. There is much epidemological evidence which gives support to this view. Prompt isolation and equally prompt disinfection of patients' premises alone offer prospect of success.

Anti-typhoid vaccine has been prepared during this year in the Bacteriological Laboratory, and protects not only against typhoid fever, but also against paratyphoid fevers. Much use has been made of this vaccine in protecting the staff of medical institutions and in inoculating on estates where typhoid fever has made appearance.

It is specially remarked that the estates in the Peter's Hall district after inoculation was adopted find themselves almost free from this disease, whereas formerly numerous cases occurred month by month.

It is very difficult to persuade residents in the towns and villages to adopt this precaution.

Tuberculosis.

This disease continues to decrease, there being 490 deaths against 499 of last year.

As might be expected, the disease is most prevalent and most fatal in the City of Georgetown and town of New Amsterdam. Unfortunately, however, every estate, village and small hamlet also records deaths from this disease.

In the city special efforts continue to be directed to the gradual improvement of house accommodation. The dread of night air is a superstition which will disappear but slowly.

Nine years of work have been accomplished by the Society for the Prevention and Treatment of

Tuberculosis, and the quiet and steady work of the two lady health visitors has done much to prevent infection of others and encourage the afflicted to fight the disease.

Malaria.

This disease shows a general increase during the year, the deaths from malaria numbering 1,264 in 1915 and 955 in 1914.

The following table indicates the movement of this disease in past years:—

	Number of deaths from malaria	Rate per 10,000 living persons
1876-80	876	36·9
1881-85	1,084	42·1
1886-90	1,398	53·1
1891-95	1,625	58·0
1896-1900	1,098	38·6
1901-05	1,368	47·3
1906-10	1,994	67·9
1911	1,624	54·9
1912	1,391	46·5
1913	1,080	35·5
1914	955	30·8
1915	1,264	40·4

The years with the lowest rate are 1878 (30·7), 1900 (30·1), and 1914 (30·8); those with the highest rate are 1890 (73·4), 1907 (78·8), and 1910 (70).

In the years of lowest mortality malaria is responsible for only one-tenth of the deaths, in the years of greatest mortality malaria accounts for as much as one-fifth of all deaths. In most years one-fifth of all infant deaths is due to malaria; in 1915 344 out of 1,799 or 19·1 per cent.

The preponderating effect of malaria in causing sickness and death in British Guiana is amply apparent to those who carefully study these questions. A superficial survey of villages in this country reveals numerous breeding-places for *Cellia argyrotarsis*, our well-known malaria carrier, and shows ample reasons why malaria should perpetuate and causes wonder that sickness and mortality is not even greater.

Work is now being done by the Government Public Health Department in villages with a view to check the recurrent epidemic of malaria.

In the towns and villages quinine is on sale at the post office at cost price (duty free).

Since December, 1906, the following amounts have been sold:—

	Ounces	
1906-07 (December to March) ...	326	$ 95 08
1907-08	1,211	353 20
1908-09	2,076	529 81
1909-10	3,000	765 62
1910-11	3,120	882 88
1911-12	2,640	682 50
1912-13	2,057	658 24
1913-14	2,427	776 50
1914-15	2,802	896 57
1915 (Nine months)...	3,096½	903 16

Efforts have been made to introduce the systematic use of quinine into the schools. This measure is now adopted in ninety-five schools. The total number of schools in the colony is about 230 in number.

Specially malarious districts have been selected for this distribution in preference to others. Both managers and head teachers have frequently given expression to the obvious benefit which results.

Much has been done on sugar estates towards eliminating the periodic epidemic of malaria. These measures consist mainly in careful drainage in the yards with constant prophylactic use of quinine supplied free for the labourers. This excellent work is, however, limited to the yards proper, and does not extend to the pasture lands which are gradually increasing in population, and in which occur the greater number of malarial deaths on the estates.

This table shows the spleen rate of children on the estates in various districts since 1911.

Districts	1911	1912	1913	1914	1915
Demerara—					
East Bank	13	7	4	7	5
West Bank	39	25	18	12	15
East Coast	18	5	5	5	9
West Coast	24	9	4	4	9
Berbice—					
Canje	20	—	7	2	3
East Bank	42	33	24	9	10
Corentyne	10	2	1	—	1
West Bank and West Coast	26	11	6	2	2
Essequebo	47	15	10	6	7

The number of deaths from malaria in estates' hospitals is as follows:—

1906-07 to 1910-11 per year	210
1911-12	167
1912-13	66
1913-14	60
1914-15	65
1915 (nine months)	78

All prisoners, members of the police force and their families, the boys of the Industrial School, the children of the Orphan Asylum, and attendants at the Government institutions are supplied with quinine free.

Ankylostomiasis.

On the sugar estates the following measures are in force:—

(*a*) The provision of latrines on all estates which, in the majority of cases are well used.

(*b*) The microscopic examination and treatment of all newly arrived immigrants from India. Of these, as a rule, 65 to 80 per cent. are found infected.

(*c*) The microscopic examination and treatment of all immigrants who attend the hospital, whether with symptoms of ankylostomiasis or not.

(*d*) On several estates a microscopic examination and treatment of all immigrants resident on the estate is gradually proceeding, and it is probable that in many the degree of infection is now well below 20 per cent.

Severe types of ankylostome anæmia are now rarely seen; the milder type of infection with chronic degenerative changes is most often encountered, the principal fatality occurring amongst pregnant females too anæmic to survive the extra burden of child-birth.

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In towns and villages no measures specially directed against the disease are in force. In villages the amount of infection is probably from 50 to 80 per cent.

The International Health Commission of the Rockefeller Foundation has elected to carry out a campaign to alleviate or eradicate this disease in British Guiana, and in 1914 carried on work in the Peter's Hall medical district. The work is systematic and thorough. Every single individual in the area selected is recorded by a special house-to-house census. Each individual is examined microscopically for infection and duly treated with thymol.

It is considered that, allowing for absent persons and for errors in microscopical work, about 70 per cent. are now free from infection, and that about 30 per cent. still remain infected.

During 1915 the Belle Vue medical district was similarly treated, and of the 11,943 persons in this area it is estimated that 78 per cent. are now free, while 22 per cent. still remain infected.

The better results are due to greater precision in the microscopical work, assisted by the use of centrifuges.

It should be noted that less people now apply for relief at the Public Hospital, Georgetown, from these two districts, whereas from other near by districts the number has increased.

A simultaneous sanitary campaign was instituted by the Government Public Health Department with a view to the erection of latrines in addition to enforcing general sanitary precautions. About 1,000 new latrines were provided in the Peter's Hall district and about 1,400 in the Belle Vue district.

In all institutions, including His Majesty's Penal Settlement, Orphan Asylum, Alms House, Onderneeming Industrial School, &c., similar systematic treatment is carried on.

Infant Mortality.

Much loss of life still occurs at ages below one year. The infant mortality rate for the colony was 184 per 1,000 births and for the City of Georgetown 228. Both these rates are higher than last year (170 and 210 in 1914), though the actual number of infant deaths was less in each case.

During the year sixteen nurse-midwives passed the qualifying examination after special training at the hospital, Georgetown, making a total of 154 so trained and qualified from 1906 to the end of 1915.

Five students received in all $150 to assist in maintaining themselves while undergoing training.

In July, 1908, an Outdoor Maternity Department was started in connection with the Public Hospital, Georgetown. This is utilized by poor women who do not enter the hospital and are delivered at their own homes. Special nurse-midwives are also subsidized by the Government.

The Baby Saving League has now passed its second year of work. It is an organization including the principal members of the community, subsidized by Government funds and carrying on work directed to reduce infant mortality.

The principles of infant feeding are now taught by all female teachers in primary schools under the advice of the Government Medical Officer of the District. Special classes in this subject for female teachers and assistants are held in the hospital, Georgetown.

Work has been carried out in Georgetown, New Amsterdam, and in the Peter's Hall, Belle Vue and Buxton medical districts.

In each district this league establishes a clinic for mothers and babies, and a system of visiting the mothers in their homes, and in each district a trained nurse-midwife is subsidized and efforts made to establish her in the confidence of the people.

In Georgetown the league has recently opened a crèche, and it is hoped that this will have more success than attended a previous effort of about twenty years ago.

The scope of the work is wider, and there is ample evidence to show that its influence is being felt in the districts now being worked. Further information on the league's work will be found in its annual reports.

Public Health Department.

This special department is now in the fourth year of existence, and has devoted attention mainly to the villages of the Peter's Hall, Belle Vue, Plaisance, and Buxton medical districts.

The measures enforced in general are the clearing of interlot drains, adjusting the level of lots, weeding off low bush, whitewashing and banking privies, screening of vats and barrels and the removal of grosser sanitary nuisances.

Much attention is paid to the milk supply, and control is carried out over an area extending thirty miles to the east of Georgetown, twenty miles to the west and ten miles to the south.

Quarantine.

During the year quarantine was enforced for plague, yellow fever, and small-pox against Venezuela and Brazil.

The quarantine regulations have been duly enforced, and no case of infection has occurred within the colony.

Seven ships were visited by the health officer and two fumigated by the Clayton machine.

The quarantine station has been inspected every three months and is kept in good order. The various disinfecting machines are regularly steamed and tried.

Vaccination.

Special lanolinated lymph from the Lister Institute, England, is now used instead of glycerinated lymph, and is found more successful.

The number of successful vaccinations during the past nine months was 2,216.

Bacteriological.

Dr. F. G. Rose, the Government Bacteriologist, has completed during this year some interesting investigations.

Special reports and papers to medical journals have been submitted on the following subjects:—

(*a*) A supposed case of yellow fever at the Public Hospital, Georgetown.

(*b*) A case of yaws co-existing with leprosy at the Public Leper Asylum, Mahaica.

(*c*) The causes of stillbirths.

(*d*) The antagonism between *B. Pyocyaneus* and *B. typhosus*.

(*e*) The part played by *B. pyocyaneus* in dysentery in British Guiana.

(*f*) Filarial lymphangitis and lymphadenitis.

(*g*) Causes of dysentery at the Alms House.

(*h*) Cultural reaction of streptococci from filarial lesions.

(*i*) Use of vaccines in filariasis.

(*j*) Infantile enteritis.

The customary routine examinations were carried out, 2,184 specimens having been submitted.

A typhoid-paratyphoid vaccine was made on a large scale from special culture, and from August 14 to December 31, 1,022 complete injections were issued.

Other vaccines, streptococcal, gonococcal, &c., were prepared for use in the Public Hospital, Georgetown.

Three hundred and twenty post-mortem examinations were made, twenty-five of which were at the instructions of the coroner.

Colonial Medical Reports.—No. 77.—Trinidad.

MALARIA REPORT, INCLUDING REPORTS ON SPLEEN CENSUS, 1914; ANOPHELES SURVEY, 1914-15; TRINIDAD MOSQUITOES, 1915.

By C. F. LASSALLE,

Acting Assistant Medical Officer of Health, Bacteriologist, &c., &c.

AND

ASSISTANT SANITARY INSPECTORS: J. D. LEACOCK, H. F. CARR, F. L. O'NEALE, J. W. PARRIS.

SPLEEN CENSUS, 1914.

THE Spleen Census was begun on September 14, 1914, and was completed on October 15, 1914.

This was a great improvement on the last Census, and the results obtained should be of greater value.

SUMMARY OF RESULTS.

For the whole colony, excluding Blanchisseuse, the results obtained are as shown in the following summary:—

Number of children examined	25,927
,, ,, with enlarged spleens	3,658
Percentage of children with enlarged spleens	14·109
Number of children with anæmia	1,576
Percentage of children with anæmia	6·08

COMPARISON OF RESULTS WITH THOSE OF CENSUS OF 1913-14.

The results of the 1914 Census are more valuable than those of 1913-14 for the reasons that (1) the Census was taken within a month, and (2) 8,432 more children were examined in 1914.

Whereas in 1913-14 the Bocas district gave the highest spleen rate, viz., 85·17 in 1914 Oropouche and La Brea was highest with 57·65 per cent.

In 1913-14 Princes Town was lowest with a rate of 0·18 per cent., in 1914 Arima was lowest with 1·09 per cent.

REMARKS.

The results are, I submit, not alarming, especially when compared with those of similar enumerations in other colonies.

There is therefore reason to expect that preventive methods against malaria in the colony will be attended by gratifying results.

C. F. LASSALLE,
Acting Assistant Medical Officer of Health.
February 3, 1915.

TRINIDAD AND TOBAGO.

SPLEEN CENSUS, 1914.

(*Taken from September* 14 *to October* 15, 1914.)

Medical Districts	Number of children examined	Number of enlarged spleens	Percentage	Number with anæmia present	Percentage
Port-of-Spain East ...	5,035 ...	65 ...	1·29 ...	7 ...	0·14
Port-of-Spain West ...	619 ...	157 ...	25·36 ...	23 ...	3·72
Bocas	344 ...	154 ...	44·77 ...	95 ...	27·62
St. Joseph and Sta. Cruz	1,036 ...	178 ...	16·24 ...	104 ...	9·49
Tacarigua	2,053 ...	51 ...	2·48 ...	31 ...	1·51
Arima	920 ...	10 ...	1·09 ...	149 ...	16·20
Manzanilla	1,311 ...	33 ...	2·52 ...	18 ...	1·37
Toco	881 ...	146 ...	16·57 ...	4 ...	0·45
Chaguanas	1,262 ...	257 ...	20·36 ...	— ...	—
Couva	1,048 ...	96 ...	9·16 ...	36 ...	3·44
Gran Couva	652 ...	38 ...	5 83 ...	2 ...	0·307
Rock River	397 ...	190 ...	32,75 ...	48 ...	12·09
Guaracara	961 ...	53 ...	5·52 ...	9 ...	0·94
Princes Town	1,078 ...	36 ...	3·34 ...	21 ...	1·95
Indian Walk	980 ...	62 ...	6·33 ...	54 ...	5·51
Mayaro	429 ...	242 ...	56 41 ...	128 ...	29·84
Erin	176 ...	94 ...	53·409 ...	28 ..	15·909
Cedros	530 ...	186 ...	35·09 ...	45 ...	8·49
Oropouche and La Brea	588 ...	339 ...	57·65 ...	249 ...	42·33
Naparima North ...	1,843 ...	591 .	32·07 ...	3 ...	0·002
Naparima South ...	657 ...	118 ...	17·96 ...	161 ...	39·73
North District, Tobago	991 ...	124 ...	12 51 ...	— ...	—
Scarboro'	1,055 ...	121 ...	11·47 ...	225 ...	21·33
Roxboro'	1,021 ...	377 ...	36·92 ...	36 ...	3·53

ANOPHELES SURVEY.

Anopheles surveys of the various districts of the Colony of Trinidad and Tobago were begun on March 15, 1914, and continued to April 30, 1915, when they were temporarily suspended.

In addition to the thorough carrying out of the instructions, the assistant sanitary inspectors were asked to advise and instruct house occupiers in anti-mosquito methods and actually to see that such minor works as clearing yards of breeding-places, &c., were done.

Quarterly reports regarding the area examined were submitted regularly for the information of the Legislative Council during the year.

The work was carried out under the immediate direction of the D.M.O.s, and with the co-operation of the wardens and assistant sanitary inspectors.

These inspectors were specially trained in the details of a mosquito survey.

Their diaries were regularly inspected by the D.M.O.s once a week, and the weekly summaries of work done were forwarded to this office through the D.M.O.s.

Mr. Towine was ordered to town, and directed to survey the very malarious region of Laventille and to give assistance at the laboratory in the classifying and arranging of specimens of mosquitoes and larvæ sent in by the other "surveyors." He proved to be an excellent laboratory assistant in every way.

The assistant sanitary inspectors have prepared a large number of rough plans of the districts in which they worked. On them are indicated as accurately as possible the situation of breeding grounds of Anopheles and their relations to main roads, villages, &c.

These plans would be of far greater value if it were possible to have them correctly drawn to scale. It would then be an easy matter for the "spottings" to be set down with precision.

Breeding Grounds of Anopheles.

In all the districts surveyed large and very extensive Anopheles breeding grounds, as well as numerous small ones, were found.

Some of the districts were found to be more infested than others, the worst being Chaguanas, Caroni, Oropouche and La Brea—well-known malarious localities.

The breeding areas may be summarized generally under the following heads:—

(1) Slowly running watercourses, streams and rivers.

(2) Pools in Ravines.—Ravines are watercourses which are generally dry during the dry season and contain pools during rainy season.

(3) Low-lying swampy and grassy land bordering on extensive mangrove swamps, containing large and small depressions, crab-holes, &c.

(4) Rice Fields.—These are very extensive in the districts of Chaguanas, Caroni, Oropouche and La Brea.

(5) Ponds.

(6) Shallow wells and water-holes.

(7) Borrow-pits at the sides of roads and railway lines.

(8) "Tapia" holes—holes from which clay is obtained for building huts.

(9) Earthen street and road drains improperly graded or blocked.

Measures.

Before detailing the measures to be adopted, it is perhaps of interest to refer to a few important considerations bearing on the possibility of success attending the application of measures and the value of such measures, more particularly as to whether their cost would be warranted by the results to be achieved.

Ronald Ross, at p. 179 of "Prevention of Malaria," states: "My proposals to reduce malaria by dealing with the breeding waters were long ridiculed because it was thought that as soon as the local output was checked mosquitoes would rush in from outside to fill up the deficiency. . . . The general results obtained from the calculations may be put as follows:—

"(*a*) Unless mosquitoes are drawn or driven in any particular direction or directions, their number will tend to be greatest somewhere near the breeding pool and to diminish progressively at greater distances from it.

"(*b*) *Per contra*, if the mosquitoes are very numerous then, *ceteris paribus*, the breeding pool is likely to be near at hand.

"These laws are confirmed by the general observation of many workers and of the public."

According to Stephens and Christopher, the "flight" of certain Anopheles in Nagpur, India, is "frequently a quarter of a mile, but does not extend to half a mile."

It seems to many people that the reduction of breeding grounds of mosquitoes in any locality is an impossibility, and even some medical men may be inclined to make such statements. The task is supposed to be doubly hopeless when such vast swamps, lagoons, &c., are to be found in all parts of the colony, principally near the sea-board.

It may be an impossibility—mainly on account of financial considerations—to eradicate every single mosquito breeding-place throughout the colony, but it is entirely within the range of practical politics to carry out a scheme of destruction of Anopheles breeding grounds within and for a certain distance around all towns, villages, estates and other centres of population.

It is not necessary to destroy every breeding ground in a place. It is sufficient to reduce their number as much as possible. It is obvious that the reduction of the danger of malaria in a locality must be directly proportional to the reduction of the number of breeding-places, the intensity of malaria infestation bearing a direct ratio to the number of mosquitoes regularly hatched out.

"It is neither necessary nor in every case advisable to remove the surface water from the whole

of a malarial country, but only in the region of habitations or where Anopheles are known to breed. In the Panama campaign the area of destruction extended only 200 yards from camps and habitations. This should probably be the minimum radius, though work at a much greater distance is only a useless expense." (Deaderick: "A Practical Study of Malaria.")

That it is possible to rid a town of Anopheles has been proved elsewhere than in this island, and it has been demonstrated conclusively in Port-of-Spain, within the limits of which an Anopheles mosquito is a *rara avis* at present, and his haunt if discovered at any time can be easily destroyed.

Through the constant efforts of the sanitary department of Port-of-Spain even the ubiquitous stegomyia and culex have almost been banished.

MEASURES IN DIFFERENT DISTRICTS.

The features in the different districts vary considerably, there being certain types of breeding-places more extensive in one than in another, and before a decision can be come to as to what public measures should be initiated in any particular district, it would seem desirable that the co-operation of the Public Works Department should be obtained, especially in regard to major drainage works.

REMEDIAL MEASURES.

These may be stated in general terms as follows:—

(1) All surface drains in villages should be properly graded to a suitable outfall and concreted as far as funds may permit.

(2) Earth drains should be kept free of vegetation and oiled once a week.

(3) All low-lying and swampy lands near villages should be drained and filled in.

(4) All useless shallow wells and ponds should be filled in.

(5) If practicable a pipe-borne constant water supply should be introduced in every village. This would render it possible to do away with shallow wells and water-holes as well as cisterns and tanks.

(6) Where a pipe-borne supply is not possible the efficient screening of all water receptacles should be secured.

(7) Borrow-pits should be filled in, or when very extensive should be efficiently drained towards the nearest watercourse.

(8) The current of streams should be accelerated by the regular removal of obstructions, viz., vegetation, debris, &c., the courses being straightened and properly trained wherever possible.

(9) In the vicinity of villages water collections which cannot be immediately dealt with should be oiled once a week, or fish, if they can live, should be put in them.

(10) Ricefields.—These mostly exist at long distances from large villages, but even where a few may be dangerously near to centres of population their abolition is not attainable.

Two methods have been advocated in dealing with ricefields, viz.:—

(*a*) A system of pisciculture, which has been adopted very generally in other parts of the world. Experiments would have to be carried out to ascertain the variety of fish best suited for the purpose in each locality.

(*b*) Another measure recommended is the periodic drying of ricefields which, if properly carried out, does not damage the crop.

OILING OR PETROLIZATION.

Kind of Oil.

Experience has shown that the best and cheapest is a mixture of crude petroleum and some lighter oil, e.g., kerosene or distillate oil, only a very small quantity of the latter being necessary—to thin the crude oil and allow of its being used with a spray.

Method of Application.

(1) An ordinary watering can with a fine rose may be used, or

(2) Pieces of rag tied on to a stick may be dipped in the oil and scattered over the surface of the water, or

(3) A spraying machine may be used. This is economical and avoids waste.

(4) In the case of large collections of water near villages, a barrel of oil may be so placed as to allow of the oil dropping constantly through small holes at the bottom. These were used at the Panama Canal, and are good automatic oilers.

The above measures are practicable, and should be carried out in all villages and within a radius of 200 yards of them. An assistant sanitary inspector would be a good moustiquier, and with a gang of a few men under him could accomplish a good deal of valuable work in a short time.

Naturally the assistant sanitary inspectors who have carried out the surveys and who have had special training would be best able to conduct the campaigns in districts surveyed by them.

The D.M.O. of each district, the Warden and the District Officer of Public Works might together supervise and direct the moustiquiers. Much of the work, e.g., concreting of drains and draining of swamps, would have to be done by the Public works Department.

Our motto should be one which, I think, will shortly become the first law of tropic sanitation, namely, "No stagnant water."

One earnestly hopes that it may be possible in the near future for the Government to provide the necessary funds to carry out some of the works indicated in this report. Minor works, such as clearing actual habitations in towns and villages of Anopheles breeding-places can and should be carried out without delay.

Probably an extension of the application of the Mosquito Regulations to the entire colony would enable this work to be done.

I therefore recommend as a first step in the campaign against malaria that Anti-mosquito Regulations, applicable throughout the entire colony, be introduced as soon as possbile.

C. F. LASSALLE.

Acting Assistant Medical Officer of Health.

July 20, 1915.

Colonial Medical Reports.—No. 77.—Trinidad (*continued*).

BOROUGH OF SAN FERNANDO.

Physical Aspect.—The Borough of San Fernando, including its immediate surroundings, except a portion of the western side, which is low-lying, consists of a series of hills with gullies between. To the north-eastern side of borough is a very high hill which is in forest. The greater portion of lands around is planted in canes.

Soil.—The soil is clayey, in the hilly parts are many quarries, especially around the hill to the north-eastern side of borough; limestone is got from these quarries.

Drainage.—Along the sides of the most important streets are concrete drains; in many other streets are earthen drains at sides. There are two large earthen drains to the western side of borough, which receive the drainage from the town. At sides of railway line are drains; throughout cane fields are drains; three ravines running through part of borough.

Breeding-places of Anopheles.—In borrow-pits at end of Broadway near to railway line *Anopheles maculipes* larvæ were found. *Anopheles albipes* larvæ were found in the following places: In drains at sides of railway line; in low-lying swampy spot on reclaimed lands at back of hospital; in concrete sink under water tanks near railway station; in two large ponds on Les Efforts lands; in drain through cane field near crossing; in borrow-pit and in ravine on Les Efforts lands, to the southern side of borough; in drain at side of Broadway Street; in drain on flat spot, on hill, to the south-east of Colony House.

REMEDIAL MEASURES.

All the earthen drains in the borough should be concreted, as the great majority are permanent breeding-places of mosquitoes. The two large drains which receive drainage from the town should be concreted up to the town boundary, and the other parts kept clear and properly graded. The sides of ponds should be kept clear and all shade removed; the grass and weeds around their sides are the favourite hiding-places of mosquito larvæ, and although there might be larvæ-destroying fishes in the water, the great majority of larvæ will surely escape.

General Remarks.—Many of the street drains and culverts are potential breeding-places of the Culicine mosquito. In the two large earthen drains which receive the drainage from the town *Culex fatigans* larvæ were found. In the ponds, drains, &c., in which larvæ were caught, were swarms of larvæ-destroying fishes in the same parts as the larvæ; I suppose the fishes like to have a change in their food at times, or the larvæ, being in such great numbers and having sufficient hiding-places, evade the fishes either altogether or for some days.

CHAGUANAS DISTRICT.

Physical Aspect.—The western part of the district from the sea to a mean distance of about five or six miles inwards is flat and for the most part low-lying; this is succeeded by a narrow strip of undulating land, immediately followed by a series of hills with altitude increasing as you go more and more eastward.

Soil.—The greater part of the soil in the western part of the district is a clay soil; in the centre, for the most part, a loam; and in the east a sandy soil with patches of loam and clay occurring here and there.

Drainage.—The drainage is effected by means of the Rivers Guaymare (pronounced Wyma), Cunupia, Caparo and Uquire, joined by a number of tributaries. The three first of these are the only natural watercourses met with in the extreme west of the area over which they run, while the last-named have feeders almost along the entire length of its course.

The number of ravines, &c., in the eastern part of the district is very great. In the western part very large drains locally known as kohahs or cocas are dug to assist in the drainage. Under ordinary circumstances the rivers and ravines are all slow-running. The distance between the Guaymare and the Cunupia, and the Cunupia and the Caparo, is in each case a few miles; and drainage in the west is consequently a very difficult matter. The low-lying nature of the land also often permits the sea water to come along the drainage channels for some distance inland.

Drainage in cocoa fields receive regular and special attention, and on that account is generally good except, of course, in neglected or abandoned areas. In cane lands the drainage is at times very bad, while in the western or low-lying part of the district road drains and surface drains of every description, with the exception of the cases above noted, can always be expected to fall below the standard of efficiency. In the eastern part of the district the configuration and, in some places, the nature of the soil are considerable aids towards effective drainage, and, in consequence, there is a great lessening of the defects in drainage observed in the western part. In this latter part not only is drainage bad, but more than that, considerable flooding occurs at times, and immense areas are inundated sometimes for days or weeks during heavy rains.

Breeding-places.—The breeding-places met with were rivers, ravines, drains, ponds, wells, holes of every description (including crab holes), ruts and depressions in the surface of roads, rice fields, swamps and low-lying pieces of land liable to be swamped, lagoons, borrow-pits along railway lines and springs.

The chief rivers, the Guaymare, the Cunupia, the Caparo and the Uquire, referred to above as slow-running, have grassy sides with all kind of rubbish and debris obstructing their course, and are ideal breeding grounds. Anopheles larvæ were found in each of them.

These are naturally permanent breeding-places. Anopheles larvæ were also found in a considerable portion of the ravines, these being similar in character to the rivers.

There are few road drains which do not have sections at least which serve as breeding-places, and Anopheles larvæ were frequently found in them. In some places they are very deep, and in some parts of Chaguanas I have come across places where they were deepened and barricaded (practically dammed) by people living near by, in some cases to store up a supply for domestic use, and in some instances to cause a diversion of a portion of the flow into neighbouring rice fields.

Anopheles larvæ were frequently found in drains about houses and in the fields also.

Wells of the most simple construction are found in many parts of the western section of Chagnanas. In some places, what are actually called wells are no wells at all; they are simply holes (big or small) dug in the earth. It may be that when they were firstly dug they obtained a small underground supply, but this must have ceased with the falling in of the sides, and they become then totally dependent on rainfall. They mostly become dry in a long drought. A great percentage of them have water up to ground level after rain.

Anopheles larvæ were found in a good many of them. Some of them were covered with duckweeds.

Many ponds which can be really so called were not found. These were mostly met with on estates. A few were found in villages. Anopheles larvæ were found in some of these also.

Holes were found everywhere. Some occurred naturally or in the common course of events and others were purposely made. They were commonly met in the surface of roads (some holding gallons of water), around houses as tapia holes, &c., in savannahs, in fields, &c. Very often they were observed in parts of the high woods as the result of coal-burning or clay-burning processes. Anopheles larvæ were found in many of them, especially tapia holes and holes in savannahs.

Almost all the unmetalled surfaces of the roads have parts so affected by traffic as to serve as breeding-places. There can be no doubt that the larger of the ruts, &c., in the roads, such as retain water for eight or ten days, do serve as breeding-places. The small ones do not under ordinary circumstances keep water long enough to allow all the stages of development to be gone through, but in continuous rainy weather they will eventually do so.

Rice-fields or rice plots, spoken of in reports relating to Chaguanas District, refer to such as have beds specially prepared to retain water, as compared with rice planted ordinarily. The whole of the Bejucal may be considered an immense rice field with a length of over two miles and an equal breadth. A large portion of Felicity adjoining Bejucal also consists of rice-fields as well, and almost the whole of Chandernagore likewise.

These places are used exclusively for rice growing. Anopheles larvæ were found in almost every part of them, and they may be regarded as Anopheles areas.

It may be incidentally mentioned that cattle-rearing goes on in these places; and the depressions made by the hoofs of these animals roaming over the fields are also important factors so far as mosquito breeding is concerned.

Other rice-fields of smaller size are met with in other parts of the district; but these are mostly confined to places which, even without such considerations, would be classed as breeding-places, such as lagoons, swamps, &c.

Lagoons, swamps, and low-lying pieces of land are found in many parts of the central and eastern portions of the district. Some of them are extensive, a lagoon on Madras road having an acreage of about forty acres. Anopheles larvæ were found in many of these.

Almost the whole length of the borrow-pits along the railway lines are breeding grounds, and Anopheles larvæ were found at various points.

Springs occur mostly in the hilly portions of the district; and while no Anopheles larvæ were actually found in any spring, yet they were found in a stream issuing from a spring at a point very near the spring itself.

Remedial Measures.

(*a*) The training and grading of rivers and ravines in parts near habitations. (*b*) Filling up or draining lagoons, swamps, &c., where possible, and stocking with fish where either of these is impracticable. (*c*) Cleaning away grass, &c., from sides of ponds, wells, &c. (*d*) Keeping all class of drains well graded as far as conditions permit, and concreting those along villages. (*e*) Filling up holes not required for special purposes, and keeping others covered with a film of oil or stocked with mosquito-destroying fish while clearing edges of grass. (*f*) Finding an outlet for water in borrow-pits, and paying the strictest attention to them. (*g*) Keeping springs clean of grass.

Although many things done may incidentally aid in the destruction of Anopheles, such as drainage, yet I have come across no means being adopted specially in that respect.

General Remarks.

All of the rivers serve as a source of supply for drinking and general purposes.

The Caparo is dammed at Perseverance and Felicity. In the former case the water is used for working the factory, and in the latter for keeping a supply for general use.

A great many ravines, too, serve as sources of supply for drinking and domestic use.

In almost every collection in which Anopheles were found, either small fish or tadpoles, and in some cases both, were also observed. In one instance a fish was actually observed attacking and destroying larvæ.

The rivers and ravines do not always have a continuous flow. In some cases portions, in others the whole of the lower part, of the course of the rivers becomes dry in the dry season. Many of

the ravines become practically dry long before that time. In most cases, however, collections of water may yet be found at intervals along the bed of both the rivers and ravines.

Many of the drains go for miles before they find an outlet; for instance, the drains along Chaguanas main road go for a distance of nearly four miles before they discharge their water into the mangrove swamp.

Couva-pointe-a-pierre District.

Physical Aspect.

The extreme south-western portion of the part surveyed contains an extent of mangrove swamp of a length of about half a mile from north to south. The swamp goes westward to the sea, but no average could be made of the width as the nature of the swamp rendered progress impracticable. Commencing from the mangrove swamp in the one case, and the sea in the other, there is an abrupt rise of between 2 and 3 ft. in the elevation of the land. This rise in elevation continues eastward uninterruptedly, with a general and gradual increase, until it finally culminates in the hilly regions of Gran Couva District.

In this respect the district may be briefly described as having the appearance of an inclined plane (the slope being from east to west).

The surface of the land from west to east is more or less a general level for a distance of about three to three and a half miles. From here eastward it undulates in varying degrees for a similar distance, after which you immediately meet with a range of hills extending almost along the entire length of the district from north to south. Part of Lower Carapichaima District in Chaguanas Ward is, however, low-lying. The whole of the district surveyed, with the exception of a part of Freeport District, is open country, generally under cultivation; extensive areas constituting large estates being under cane.

The part of Freeport District spoken of above as forming the exception consists of forest land, and constitutes a portion of the north-eastern part of the district.

Soil.

The soil of the greater part of the district is a loam, and possesses a marked amount of porosity.

Part of Lower Carapichaima and Orange Field Districts is clayey. Sandy soils are mostly met with in the central part of the district. The part of the district extending southward from Chase Village to Freeport and Upper Carapichaima, and from Freeport along Calcutta Settlement to Spring Village and Balmain Village, consists for the most part of sandy soil. The only other instances of sandy soils are found in the villages of Upper and Lower McBean.

Drainage.

Three rivers traverse the district, viz.: The Couva, Savonetta, and Arena. The two first-named are on the southern side of the district, the latter of them being a tributary of the former. The Arena runs along the eastern side of the district.

A considerable number of ravines and watercourses are also met with. The majority of these have a source and course quite independent of each other.

A general system of drainage, by means of ordinary surface drains, obtains on all the larger and the greater portion of the smaller estates in the Couva District.

In pursuance of this system, the flow of many of the smaller ravines is intermittently diverted to drains, the course of the ravine being at times utilized for planting. In consequence of this many ravines, and sometimes watercourses, become lost in the drains dug in the estates. In cases, too, where small ravines run along wide hollows, the ravines are at times superseded by a system of drains the land between which is used for planting. Ravines often have their origin in drains. In consequence of the circumstances above mentioned, the source and extent of ravines cannot be strictly determined.

Both the Couva River and the Arena River have a continuous and perennial flow, although in the dry season this flow is so meagre in some parts as to cause such parts to be considered practically dry; these parts forming, moreover, the intervals between larger bodies of water lying in the more deepened portions of the beds. Parts of the Savonetta become totally dry in the dry season.

The Savonetta and the Arena have a fairly good depth for rivers of that type; but the depth of the Couva River demands special notice on account of its position as regard many of the villages in Couva District in the matter of a malarial survey.

This river, which is fairly wide, has a depth from the edge of the bank to the bed generally of over 20 ft. It receives the drainage of the greater part of Spring Village and Balmain Village and all the villages of Couva proper.

In the case of the latter group the street drains and surface drains in yards take the drainage to the two drains running from east to west along the Couva main road (part of the southern main road), which discharges into the lower part of the Couva River generally known as the Couva River Bay. The Couva River receives in addition the drainage of the estate lands adjoining and intermediate between the above-named villages.

As I was not in the district during the height of the rainy season, I have no off-hand knowledge of its liability to overflow its banks; but the force of the current consequent on the general lie of the land, and the matter of its depth, as spoken of above, appears to me to preclude the idea to overflow and the consequent flooding of adjacent parts of the district, except under very extraordinary or indeed phenomenal conditions of weather; and it is under these circumstances that I have considered the request for special attention with respect to this river by no means uncalled for.

As already stated, the estates are provided with surface drains. In very many cases these are supplemented by large watercourses. In all of the villages drains are dug along the village streets and main roads. All of the public roads, both main roads and local roads, are provided with drains. The more important of the estate roads have drains also.

In the majority of instances the drains connect with rivers or ravines or large watercourses. In some cases, after continual interception, they finally connect with a main drain which goes directly to the sea. Of road drains going directly to the sea only one instance is known, and that is in the case of drains along the Couva main road, which reach the River Bay (practically the sea) after a course of more than two miles. Road drains generally have outlets in estate drains and vice versa.

In areas used for rice cultivation agencies are employed to counteract any advantage that might exist in the matter of natural drainage, as proper drainage would operate against the success of the enterprise.

While, as might be expected, patches of irregular flat land or low-lying land likely to be flooded were occasionally found in different parts of the district, all of them small; a portion of Lower Carapichaima District (part of Bank Village and Ramjohn Village) being the only large area in which flooding seems likely to occur. In no case, however, was there evidence found to justify an opinion that attempts at proper drainage would not be attended by success. In all cases the opening, deepening or proper grading of existing drains, the construction of new or additional drains or, may be, the opening of a ravine connected with them is all that is necessary.

None of the watercourses had a direct course to the sea. They either got intercepted by the many surface drains made in cultivated areas and became lost, or served as feeders to rivers or ravines.

Breeding-places.

The ordinary breeding-places found were: Rivers, ravines, watercourses, drains, ponds, wells, springs, tapia holes, holes and depressions made by hoofs of animals and by traffic, holes of unknown origin and those dug occasionally for the requirements of certain local conditions, e.g., the repairing of bridges or the plastering of mud huts, &c., rice fields and rice plots, pieces of irregular flat land and pieces of low-lying land likely to be swamped, and borrow-pits along the railway line.

A few cases of extraordinary breeding-places were noted, and these consisted of tayches or coppers found in estate lands or about the yards, and a large disused concrete cistern.

Following are notes in connection with the several kinds of breeding-places:—

(*a*) *Rivers.*

Of the three rivers in the district, Anopheles larvæ were found in only one, viz., the Couva River. The actual breeding-place was in a part of the river where the current was very slow, and consisted of one of the many bodies of water forming pools at intervals along the course of the river during the dry season as a result of the great diminution of the flow. The bed of this river is gravelly throughout, in some parts fairly large boulders being found. Culicine larvæ only were found in both of the others. The water in both of them was turbid, especially so in the case of the Arena, where it was very black and muddy. The water of all these rivers is used to some extent for drinking and domestic purposes. Fishes were found in all of them.

(*b*) *Ravines.*

The majority of the ravines are, in a greater or lesser degree, liable to serve as Anopheles breeding-places. In the undulating parts of the district the beds of some of them have such a sharp slope as to render them negligible so far as malarial breeding-places are concerned.

With few exceptions they are all small. They generally become completely dry in the dry season, those which retain water having only occasional pools. Anopheles larvæ were not found in many, as the greater part of them was found in a dry state.

Fishes and tadpoles were found in many of them.

(*c*) *Watercourses.*

Anopheles larvæ were found in some of the watercourses. In the case of those occurring in savannahs, the conditions effecting the formation of breeding-places were very often the presence of numerous holes and depressions formed in their course by the hoofs of animals.

In the case of those occurring in cultivated lands, the condition consisted either of the embankment made for the construction of rice plots or improper grading.

(*d*) *Drains.*

The drains in estate fields, especially cocoa, are, generally speaking, well constructed, and receive very good attention. Grading and cleaning seem to be fairly well looked after. In spite of this, however, some drains do get out of order, and these become Anopheles breeding-places. The drains in fallow lands or lands recently harvested are, as a rule, neglected until such time as the lands are ready for tillage; and sometimes cattle and other stock are allowed to pasture on the lands during the interim. In consequence of these circumstances drains in such lands are generally breeding-places.

A very noteworthy feature as concerns drains in estate fields is the condition of the culverts. The vast majority of culverts have defects rendering them liable to serve as breeding-places. They are mostly found connecting the parts of drains on opposite sides of traces. In many cases the concrete pipes or jar pipes forming the culverts sink into the earth to a good depth below the general level and water remains in them; or else a hole is formed either at one or both ends of the culverts, and the holes thus formed become breeding-places. Anopheles larvæ were found in many of them.

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Parts of road drains along public roads, village streets and estate roads were found to be breeding-places, and Anopheles larvæ were found in them. In many cases the condition causing the formation of breeding-places was the fact that very often earth or other substances were thrown into them to form a bridge leading to a house or into a field.

The same remarks made with respect to culverts connected with drains in estate fields apply equally well to culverts connected with main drains, ravines and watercourses crossing roads. In cases where the part of the road drain adjoining the culvert is the only part of the course affected, the road drain is necessarily considered as the breeding-place.

In some places surface drains in yards and around houses and in kitchen gardens near to houses are greatly neglected; indeed, in some places they seem to be a matter of the least possible concern. Anopheles larvæ were found in some of them.

There is a most sorrowful display of negligence in this respect on the part of some of the residents of the villages of Couva proper.

All of the yards have an easy means of drainage to the street drains which have their outlet in the drains along the Couva main road or directly to the latter drains. These latter drains are deep and have a good gradient; but in the majority of instances no advantage is taken of such excellent provision for the drainage of yard and kitchen gardens.

(e) Ponds.

Very few ponds were found. Those found were with one exception on estates. Anopheles larvæ were found in two of these. In some cases the water was used for drinking and other domestic purposes. Fishes and tadpoles were found in most of them.

(f) Wells.

Couva District abounds with wells. A very general use is made of well water for all purposes. Some of these wells have water at a depth of over 20 ft.; the general depth in this respect, however, seems to be between 13 and 14 ft. Wells were found having water at land level or at a depth of about 2 ft. from land level. Culicine larvæ were found in some of them.

(j) Rice Fields and Rice Plots.

In the formation of rice fields and rice plots rows of banks are made to cause the retention of water in the beds, and this condition makes them favourable to the breeding of Anopheles mosquitoes. With the exception of a small disused rice-field in Calcutta Settlement, all of them were found in Carapichaima and Freeport districts. All of them were dry.

(k) Borrow-pits.

The borrow-pits along the railway line in Couva District were generally found in good condition; but at a few places near the Couva railway station there were notable defects of drainage which occasioned the formation of breeding-places. No larvæ were found.

(l) Extraordinary Breeding-places.

In the cane estates iron tayches of fairly good size are found near derricks and in other parts of fields.

In the case of estates having condemned factories, some are also found near the sites of the factories. In the former case these seem to be used for supplying water to stock working about the fields; in the latter they are generally of no special utility, but stand only as relics of the articles previously used in the factories. They are sometimes found holding water and having grass growing up their sides and down into them. Anopheles larvæ were found in one situated in a coconut field in Perseverance estate. It had a branch of a coconut tree resting in it, and a detached branch of a shrub floating in it.

Those around old factory sites were found dry, but contained dirt with grass growing in it. The only other item in this class is that of an old disused cistern having weeds and vines growing down its sides. It was on the site of the famous Assee murder at Preysal Junction.

REMEDIAL MEASURES.

For general the following are recommended as being practicable, viz.: (1) Training and grading rivers and ravines in the vicinity of habitation and a fairly good distance away; (2) concreting road drains and street drains running through villages, and clearing and grading all classes of drains as far as possible; (3) clearing the edges of ponds and springs of grass, and stocking them with mosquito larvæ destroying fish; (4) filling up tapia holes and holes not wanted for particular purposes, stocking others with fish, and clearing the edges of grass; (5) draining such lands as are liable to be flooded; (6) levelling of roads, traces, &c., which have holes, ruts and depressions; (7) proper drainage of railway borrow-pits.

GENERAL REMARKS.

Many of the breeding-places found were very near to houses, some being only 2 or 3 ft. away.

So far as direct means being adopted to deal with malaria are concerned, my observations are limited to the following, viz.:—

(*a*) On Waterloo Estate, Carapichaima, grassy drains near the barracks were being treated with crude petroleum.

(*b*) A few people have recently been filling up tapia holes to prevent mosquito breeding.

In some instances tapia holes are filled up for no particular reason; at times they are used as dumping-grounds, and in that way become filled.

I have observed that some of the larger estates fill in the ruts and depressions made by traffic in the roads and traces.

Only one instance of a screened house was noticed, and that was the overseer's quarters at Exchange Estate.

La Brea and Oropouche Ward Unions.

Physical Aspect.

The eastern and southern parts of the ward for the most part consist of very wide, low-lying areas (lagoon) with high ground here and there. The western part is hilly, with alternate low-lying areas. The northern part of the southern side for the most part is hilly; to the north between La Brea and Guapo is a large low-lying area.

Soil.

The nature of the soil to the eastern, western, northern, and southern sides is clayey for the most part. Part of the western side (about Fyzabad) is loamy, part of the southern side (about Siparia) is sandy, and part of Peñal is loamy.

Drainage.

To the eastern side are no particular meaus for draining, but here and there a ravine is to be found.

To the western side and about Fyzabad Settlement are two small rivers and several ravines; there are no borrow-pits, except at sides of main road a few hundred feet from Grant's cocoa estate; about Bakra Chati Village are ravines and borrow-pits used as drains.

To the northern side are two rivers, and in the low-lying part between Point Fortin and Guapo are ravines, borrow-pits, and large drains (khokas).

To the southern side and about St. Francique Village and Peñal, through lagoon and at sides of roads are borrow-pits, large drains (khokas), and two rivers run through these villages.

Remedial Measures.

The low-lying areas used for rice planting during the wet season when they are holding water should be stocked with larvæ-destroying fishes (millions and guabins); low-lying areas not used for rice planting should be filled in whenever this is feasible, when it is not, they should be drained and pools oiled with distilled oil. Borrow-pits, especially at sides of railway lines and roads, should be opened and made to empty in rivers, ravine or drain and kept regularly graded and cleaned, and pools in them oiled. The great majority of water holes in villages serve no useful purpose whatever and should be filled in; the useful ones should be kept free from grass and weeds, bushes and trees around them trimmed or cut down, and they should be well stocked with larvæ-destroying fishes (millions).

In the case of drains, ravines and rivers, the owners of lands through which they run should be made to clear and grade them regularly.

The pitch holes at La Brea should be stocked with millions, if they will live in the water, or oiled at least once a week; pools on pitch lake should be also oiled weekly.

General Remarks.

La Brea and Brighton, being mining districts, will always have accumulations of water in pitch holes and on pitch lake.

At Fyzabad the great majority of people are East Indians; each is the holder of a few acres of land on which he must have one or two water holes to get his supply of water during the dry season, and a low-lying spot for planting his rice during the wet season. At Rousilliac, at Francique and Peñal rice is planted chiefly on the lagoon. In the majority of villages *Anopheles albipes* larvæ were found; in Rousilliac, St. Mary's village, St. Francique, and Fyzabad *Anopheles maculipes* were found; at Fyzabad *Anopheles argyrostarsis* was found, and at Morne L'Enfer and Siparia *Anopheles bellator* larvæ were found.

In different parts of the Ward Unions, culices, *Uranotænia lowii* and *gcomctrica*, *Joblotia nivipes*, *Sabethoides nitidus* and *Sabethes remipes*, *Limatus durhamii*, *Stegomyia sexlineata* and *calopus* and *Culex tæniorhynchus* larvæ were found.

In not one pool at La Brea and Brighton were larvæ-destroying fishes found, and in very few collections of water in the other villages in the wards.

Laventille District.

Physical Features.

From the town boundary for a distance of three-quarters of a mile the area is narrow, with houses on the north side only; beyond this it widens out with houses on both sides of the eastern main road, which runs in an easterly direction. From the hills the land is irregular, cut up by watercourses; the flat, irregular, uneven portion to the north side is somewhat bushy, containing many hollows and depressions. On south side, Mangrove swamp (Laventille swamp) reaches up to eastern main road at a point about one mile from Port-of-Spain. From here the swamp recedes to the south, continuing further east for about one mile, at distances varying from 10, 20, 30, 40 yards from the eastern main road, but it again adjoins the main road at the two-mile post.

The land is flat, irregular, and badly graded.

Railway Lines.

The Government railway line runs through the Laventille swamp on the southern side of, and parallel to, the eastern main road.

The areas covered with sedge-like grass near the Government quarry and at Prizgar's quarry contain many artificial depressions from quarrying.

Drainage

finds it way by watercourses down to flat land, spreads out into ravines, then into earthen drains not well graded, through culverts across main road to south side in swamp.

The railway embankment in the wet season

retards the drainage, causing the southern area to be waterlogged. At Barataria the earthen drains are not graded, nor laid out in any system.

Water Supply.

John-John Village from standpipes in Clifton Hill, and rain water collected and stored in barrels, pans, &c., unprotected, not screened.

Success Village from tap at Government quarry, well water; rain water collected and stored in unscreened barrels, &c.

Barataria estate from standpipe (water from San Juan River) and wells.

Remarks.

The area covered with sedge-like grass near the Government quarry and east of John-John Village proper, which contained Anopheles breeding-places, was improved on some time last year by the filling in of all pools, clearing and cutting down of all bush, and grass, and draining. There are no collections of water within that area.

Diego Martin District.

Physical Aspect.

This district is hilly in the east and west, having a valley in the centre running north to south. It has many springs. The Diego Martin River runs in the centre of the valley.

The soil in the valley is composed of clays and loams; it is rocky in the hilly districts.

The Diego Martin River is the main line of drainage running north to south through the valley, and receiving the drainage from the hills by ravines. It empties into the sea.

Remedial Measures.

The river is sluggish, having low-lying parts, and the water further obstructed by grass and weeds, branches of trees, &c. It is also dammed up to obtain water, which is run on to herb gardens for irrigation purposes.

These conditions make it a favourite breeding-place for Anopheles.

Those parts of the river used for irrigation purposes cannot be dealt with owing to their use. Other parts of it are used for drainage of cocoa fields, &c., and can be cleaned, trained and graded, or oiled.

The drains in the gardens, used for irrigation, cannot be attended to, as the water in them must be kept stagnant or slowly running.

Pools were found on land at the sides of the river; they can be filled in.

Quinine treatment of the inhabitants is advisable in this district as many of the breeding-places cannot be dealt with.

General Remarks.

Water from hill springs, flowing over flat land occupied by herb gardens, is utilized in the drains for irrigation purposes. These also form Anopheles breeding-places.

Bush mosquitoes were troublesome in the cocoa fields during the day. Their breeding-places were found in tree holes, including bamboo joints, bromeliads and wild pines, balisier flowers (*Heliconia champneiana* (Griggs), Traveller's palm (*Ravanella Madagascaricusis*).

Many larvæ-destroying fishes were found in Anopheles breeding-places—Millions (*Girardinus Guppii*), Small Sardines, Small Guabin (*Rivulus Hartii*), and "coscorobs."

The larvæ seem to escape them by hiding in the vegetation of the breeding-places and remaining at the surface of the water.

St. Joseph District.

Physical Aspect.

The northern part of the district is mountainous, being occupied by the Northern Range. The ridges of the range are so arranged as to form valleys, as Maracas and Santa Cruz; and bays as Maracas Bay and Las Cuevas Bay.

The southern portion of the district is flat, being on the western part of the Caroni Plain, and is swampy, especially during the rainy season.

Soil.

The soil consists of clays, usually having strata of loams at the surface.

Drainage.

In the northern part of the district the drainage of the bays goes north by ravines to the sea.

The valleys are drained north to south by the Santa Cruz and St. Joseph Rivers, which fall into the Caroni.

The drainage of the southern portion of the district goes from east to west by the Caroni and Guaymare Rivers, which lead to the sea. Many ravines and streams lead to the rivers.

Remedial Measures.

Pools.—These were found on waste land and uneven ground, and retain rain water. They can be filled in.

Lagoons.—These were found at the sides of the Santa Cruz and Guaymare Rivers. They can be filled in.

Drains (earthen).—These were found at the sides of the Caroni main road and the southern main road, and in the estates. Those at the sides of the roads can be trained and graded, or cleared of vegetation and oiled. The estate drains should be properly made so as not to retain water; badly made ones can be trained and graded.

Ravines.—These were found in the estates, occasionally serving as main drains. Their beds are uneven and they retain water, especially during the rains.

They can be trained and graded.

Streams and Rivers.—These form breeding-places as they flow over the plain; their beds are usually obstructed by grass and weeds, and even debris brought down by rains, which make them sluggish and often stagnant during the dry season.

They can be cleaned and drained; some of them have low-lying beds and can be cleared of vegetation and oiled.

Borrow-pits.—Borrow-pits were found at the side of the railway line at St. Augustine and Caroni Villages. They can be cleared of grass and weeds and then oiled.

Swamps.—The Caroni Swamp, with the rice-fields, form an extensive Anopheles breeding-place. Part of the land is flooded by the sea, forming a permanent breeding-place; the other part forms a breeding-place during the rains, when the water settles over the land. This breeding-place cannot be dealt with owing to its nature and use. The inhabitants should be treated with quinine. Adult Anopheles can also be caught and destroyed in this district. The swamps at Maracas and Las Cuevas Bays cannot be drained owing to the sea; they can be oiled, but the few inhabitants may not warrant the expense.

Other pieces of land become swamp in the rainy season, such as the pasture of the Government Stock Farm, St. Joseph, and other grassy land for grazing cattle. They contain pools, ground made uneven by the hoofs of the cattle, and shallow, badly made drains.

These places can be filled in or drained.

Tree Holes.—These form breeding-places for *Anopheles eiseni* Coq., when they retain rain water. Larvæ were found in a tree hole on Mount Tucuche.

These breeding-places can be filled in when near to houses.

General Remarks.

In this district adult mosquitoes were troublesome during the day and night, increasing in numbers during the rainy season, especially at Caroni and St. Joseph; at these places, besides a great number of culicines, *A. albipes*, Theobald, were found around houses during the day. Smoke and nets were used sometimes as a protection against them.

The Caroni Swamp is the favourite breeding-place of *A. albipes*. They even breed in the salt water that comes over the land from the sea. Larvæ were very numerous all over the swamp, even against the walls of the houses. The adults were also very numerous.

In this district they appear to be domesticated like *Stegomyia calopus*, Meigen. During the day they were found resting against the walls of the huts, on the floor, and in water-barrels, biting the inhabitants occasionally. As many as twenty adults could be taken in one hut after collecting for a few minutes.

Tacarigua District.

Physical Aspect.

The northern portion of the district is very mountainous, central, generally flat, with gentle slope towards south. Southern, low-lying, swampy more or less, especially so during the wet season. There are two main ridges, one at Lopinot to the north-east and north of Arouca, ranging from north to south, and the other at Caura to the north-west, and north of El Dorado Village, Tacarigua, ranging from north to south also.

These throw out offsets. The principal are the Arouca and Caura, between which are valleys which bear the same name. El Tucutche, the highest peak in the island, 3,100 ft. above the sea-level, is to the north-west of this district.

Between Maracas and Caura is fairly bushy.

There are also low-lying lands adjacent to high grounds here and there to be met, with very little forest lands. There are many cocoa estates to the northern portion of the district; whilst to south sugar-cane is more grown.

The centre where sugar-cane once grew is now turned into villages.

Soil.

The soil to the north of the district is greatly varied, some parts light, clayey, loamy or rocky. To centre, clayey and sandy, and to south alluvial.

Drainage.

The drainage is effected by means of the tributaries of the Caroni. The principal are: The Arouca, Tacarigua, locally called the Caura, Oropuna and Tunapuna Dry River.

The tributaries take their rise in the northern part of the district and are fed by many streams and ravines which flow in a southerly direction, and empty themselves into the Caroni River.

There are also road drains, drains and ravines in cane and cocoa estates; these in turn join larger ravines, which finally empty themselves into the Caroni River. On account of the northern portion of the district being very mountainous, it gives rise to the many tributaries of the Caroni, and the ravines also, all these flowing due south, so that portion of the district is well drained; but during the heavy rainy season the Caroni has become swollen to the overflowing of its banks, all its tributaries and ravines are being backed, consequently the southern portion of the district being low-lying may be under water for weeks. Drainage in the south is a difficult matter. Drainage in some of the cocoa and cane fields receives regular attention, but in abandoned areas is not looked after at all. Roads, villages, and surface drains do not receive regular attention, especially in the central and southern portions, although in some parts the nature of the soil aids drainage.

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Breeding-places of Anopheles.

Anopheles larvæ were found where there were grass and weeds growing to the sides, bends, pools, and sluggish portions of the following tributaries, viz.:—

The Tumpuna Dry River, Tacarigua, locally called the Caura, Arouca, Oropuna, and part of the Caroni River.

The eastern main road drains, ravines in cane and cocoa estates, depressions along cane estates and village traces, made by wheel traffic and the hoofs of animals.

Drains at the sides of the Lopinot and Caura Roads. Sluggish ravines overgrown with grass and weeds running through cane, cocoa and abandoned areas. To the sides of ponds where there was grass growing.

Yard drains around huts in small villages.

Tapia holes around huts and houses.

Shallow wells where there was grass growing at sides; depressions in the Orange Grove, Paradise, Bon Air and Piarco savannahs; low-lying grassy lands adjacent to high grounds, and rice-fields.

Remedial Measures.

The training and grading of the tributaries, river and ravines, especially near huts and houses. The filling in of all depressions along cane estates and village traces, or the thorough macadamizing of same.

The regular cleaning out and grading of all road drains and the concreting of those in villages and yards.

The removal of all grass and weeds to edges of ponds, and the thorough plastering of same with clay, also the stocking with mosquito larvæ-destroying fish.

The filling in of all tapia holes around huts and houses.

The removal of all grass and weeds from around the edges of shallow wells and the stocking with mosquito larvæ-destroying fish.

The thorough filling in of all depressions in savannahs and grassy lands.

The thorough draining of all low-lying grassy lands.

The keeping of all springs clear of grass and weeds, and the stocking with mosquito larvæ-destroying fish.

The removal of all wild pines from trees in the neighbourhood of huts and houses.

The clearing away of bushes and balisier, at least 100 ft. away from huts and houses.

The oiling of pools; better to fill them in.

The filling in of all holes in trees and bamboo joints with earth.

The rice-fields uncontrollable, but may be stocked with mosquito larvæ-destroying fish.

The filling in, thorough draining, or stocking with mosquito larvæ-destroying fish in swampy areas.

The quinine treatment may also be used.

The thorough screening of all openings of barrels and tanks with wire netting eighteen meshes to the inch, and outlets controlled by a tap.

Disused estate coppers should be also stocked with mosquito larvæ-destroying fish, or oiled; better to turn them over.

General Remarks.

All of the tributaries, and mostly all of the ravines, supply water for domestic purposes. In almost all of them where Anopheles larvæ were found, fishes and tadpoles were also present. Water spiders, dragon-flies, along with small fishes, were also seen attacking and eating larvæ. There is always a portion of sluggish running water in the tributaries throughout the year, with the exception of the Tumapuna Dry River, where pools may also be seen here and there. Mostly all of the ravines become dry during the dry season and some even before. Pools may also be seen here and there.

All of the tributaries extend for miles before discharging themselves into the Caroni, and a few of the larger ravines also.

The main roads are metalled and in good repair; and the drains, which are earthen and concrete, are looked after occasionally.

The local roads are part metalled and remainder natural soil; earthen drains looked after occasionally.

Inroads and traces to small villages, very little or no attention are paid to them. They are laid out on natural soil, and are sometimes impassable during the heavy rainy season, and generally form breeding grounds of Culices and Anopheles mosquitoes.

Arima District.

Physical Aspect.

The Northern and Central Ranges are woody districts. The land between them, in the Arima District, is the eastern part of the Caroni Plain—land which is slightly rolling, becoming hilly about Mount Tamana in the south. Over the plain there are many patches of forest and natural savannahs; the land is uneven in these places, being thickly covered with shallow holes formed by the decay of vegetation.

Soil.

The surface soil of the district is composed of loams principally; in some places there are sands and peat. The underlying strata are composed of clays principally.

Drainage.

The district is drained by many rivers, streams and ravines. The principal river flows south from the Northern Range to Cumuto as the Aripo, and then from east to west as the Caroni, flowing through the Caroni Plain to the sea. The other rivers—Tumpuna, Cumuto, Guanapo, El Mamo, Arima, &c.—are its tributaries. The ravines are

generally found in estates, &c., and lead to the rivers. In the mountainous and hilly districts the drainage is good. In the rainy season the water-courses on the plain carry away a great deal of drainage water, but owing to the land being flat and uneven, many swamps are formed, as the rain water remains in the shallow holes of the natural savannahs and clearings of the forest around houses. In the dry season many of the water-courses become stagnant.

Remedial Measures.

Isolated Pools.—These were found as springs in villages forming the water supply, or where rain water remained in hollows, &c. Springs can be concreted or cleared of vegetation and stocked with mosquito-destroying fish. Other pools can be filled in.

Areas of Pools.—These are formed in some villages where the inhabitants dig holes in yards to obtain clay to build the houses. After the houses are built they are seldom refilled, and retain rain water forming Anopheles breeding-places. They can be filled in. Other pools are made over large areas in some districts by digging holes in yards to retain rain or spring water which is used for domestic purposes. These are called water holes. They can be cleared of vegetation and stocked with fish.

Areas of natural pools are found on the natural savannahs and forest districts, and retain water during the rainy season. They cover large areas and are very numerous. In some villages they are useful during the rainy season for growing rice, &c. There are few houses on the natural savannahs, but in the forest districts clearings are made and houses built. The pools in the clearings soon become grassy and form most suitable breeding-places for Anopheles. These natural breeding-places cannot be destroyed owing to their extent and use.

Quinine treatment is more suitable.

Lagoons.—These were found at the sides of rivers and ravines. They can be filled in.

Drains (earthen).—These were found at the sides of lanes and streets as at the town of Arima, and at the sides of traces, main and local roads in other parts of the district. They are usually badly made and retain water, especially during the rainy season, forming Anopheles breeding-places. These breeding-places can be concreted; when concreting is too expensive they can be trained and graded, or cleared of vegetation and oiled.

Drains were also found in estates, &c., made for irrigation and drainage. Those made for drainage purposes were also usually badly made and retained water, forming breeding-places. The irrigation drains form breeding-places owing to their nature, containing stagnant or slowly running water. These agricultural drains can be properly trained and graded when used for drainage purposes; when used for irrigation purposes they can be oiled or cleared of vegetation and stocked with fish.

Borrow-pits.—These were found at the side of the railway line at Guanapo Station and at the sides of Cumuto-Tumpuna Road. Those at the sides of the road can be filled in, and those at the side of the railway line can be cleared of vegetation and oiled.

Ravines.—These were found in villages receiving drainage from various premises, and in estates serving as main drains. The beds are uneven, and they retain water in hollows, forming Anopheles pools, or contain stagnant and slowly running water along the entire bed. They formed favourite breeding-places for Anopheles.

They can be properly graded to the rivers, to which they lead, and when this is impossible they can be cleared of vegetation and oiled.

Streams and Rivers.—Owing to the large rainfall of the district no larvæ were found in these places during the rainy season, as they generally run full, but as the dry season came on many of them became stagnant or slow-running, especially as they passed through the plain. The pools around the houses having dried up from the effects of the sun, the Anopheles began to breed in these new breeding-places.

In some of these rivers the Anopheles breed among grass and weeds growing at the sides or over the bed; in others they breed among dead leaves and green algæ at the sides or in pools in the bed. These streams and rivers can be trained when slowly running, and cleaned or oiled when stagnant.

Swamps.—Pieces of swampy ground were found in some villages, and at the town of Arima—in waste land becoming grassy and retaining rain water. Swampy savannahs were usually found around the houses on estates. They contained badly made drains, ground made uneven by hoofs of cattle, and sometimes natural pools retaining water during the rains. These swamps can be filled in or drained.

Large swamps were found, as in Arena District (Tumpuna), formed by springs over large areas of low-lying ground. These breeding-places are too expensive to be dealt with. Prophylactic treatment of the inhabitants with quinine is recommended.

Bush mosquitoes were common in the cocoa fields and forest. Adult *Anopheles argyrotarsis* Rob-Des, *A. albipes* Theo, and *A. maculipes* Arri. were found in houses.

Guaracara District.

Physical Aspect.

The northern, eastern and western portions of the district are mountainous, and these slope towards south. Southern undulating, some parts low-lying, swampy, especially so during the wet season. This district, from its serrated or cut up hills, has a surface diversified by the Tabaquite Hills, Central Range, Tortuga Hills, those of Whiteland and many others, all of which are interspersed by valleys, through which rivers and ravines flow. There are many forest lands to be

met with at Tabaquite, Piparo and Brothers Settlement to sides of roads. There are many cocoa estates to the north, east and west of the district, whilst to the south sugar-cane and rice are more so grown. There are also many springs—the largest is the Morichal. There are many others at Whiteland, Mayo, Atagual, Tabaquite and Piparo Settlement.

Soil.

The soil on a whole is greatly varied, being sandy, clayey or loamy, but more so rocky. To some parts in the south alluvial.

Drainage.

The drainage is effected by means of the following rivers, viz.: The Guaracara, Mayo, and the Guanapure.

These rivers take their rise in the northern portion of the district, and are fed by many streams and ravines. They flow in a south-westerly direction, and empty themselves into the Gulf of Paria.

There are also road drains, drains and ravines in cocoa, cultivated and forest lands. On account of the district being very hilly to north, east and west it gives rise to the many rivers, streams and ravines, all of which flow due south-west, and these portions are well drained; but during the heavy rainy season, when the Guaracara and Mayo Rivers become swollen to the overflowing of their banks, the southern portion of the district may be under water for weeks; drainage in the south is somewhat difficult. Drainage in most of the cocoa fields receives regular attention, also in small cane cultivations, but in abandoned areas and forest lands is not looked after at all. Drains to sides of main roads are fairly well attended to; but those to the sides of local roads and traces in villages do not receive regular attention. The nature of the soil aids drainage in some parts.

Remedial Measures.

The training and grading of all rivers, streams and ravines.

The removal of all grass and weeds to edges of ponds and the thorough plastering of same with clay, also the stocking with mosquito larvæ-destroying fish.

The thorough draining of all low-lying grassy lands.

The filling in of all depressions in flat grassy lands.

The filling in of all holes to sides of road and village traces.

The filling in of all depressions along roads and village traces, or the thorough macadamizing of same.

The regular cleaning out and grading of all roads and village drains; it would be better to concrete them.

The keeping of all springs and shallow wells clear of grass and weeds, and the stocking with mosquito larvæ-destroying fish.

The filling in of all borrow-pits, oiling, or the thorough draining of same.

In the case of rice-fields and large swampy areas which cannot be controlled, the quinine treatment of the inhabitants might be resorted to.

The removal of all wild pines from trees in the neighbourhood of huts and houses.

The clearing away of all bushes and balisier at least 100 ft. away from huts and houses.

The filling in of all holes in trees and bamboo joints with earth.

The thorough screening of all openings of barrels and tanks with wire netting eighteen meshes to the inch, and outlets controlled by a tap.

General Remarks.

The rivers, streams, ravines, ponds and springs supply water for domestic purposes. In almost all of them Anopheles larvæ were found; fishes and tadpoles were also present.

Some of the ravines become dry at certain times of the year. The rivers and large streams also become dry, but pools may still be seen here and there under shaded parts.

These rivers extend for miles before discharging themselves into the Gulf of Paria.

Adult mosquitoes were very troublesome in cocoa fields, bushes and along the shaded portions of roads and traces at all times of the day, viz.: *Stegomyia calopus; Edes scapularis, serratus* and *sexlineata; Culex fatigans* and *confirmatus; Wyeomias; Limatus durhamii; Joblotia niripes; Anopheles albipes* and *pseudopunctipennis.*

In huts and houses during the day: *Stegomyia calopus, Culex fatigans* and *Wyeomias;* occasionally: *Anopheles albipes* and *pseudopunctipennis;* at night: *Culex fatigans, Anopheles albipes* and *pseudopunctipennis;* forests during the day: *Anopheles bellator* and *mediopunctatus.*

Inroads and traces to small villages; very little or no attention are paid to them. They are laid out on natural soil, and are sometimes impassable during the heavy rainy season; most of them form breeding grounds of Anopheles and Culices.

On a whole the Guaracara District, on account of its numerous rice-fields and large forest, particularly at Tabaquite, it is somewhat a difficult matter to stamp out the breeding grounds of Anopheles mosquitoes. During the inspection of the district it was noticed that the construction of the Tabaquite railway extension caused the formation of many Anopheles breeding-places.

Erin-Guapo District.

Physical Aspect.

Cap-de-ville, Irois and Chatham are hilly for the most part with gullies between the hills, and in some parts there is a low-lying spot at foot of hill. In the two last-named villages are low-lying and swampy spots near the sea. Part of Guapo is hilly and part low-lying and swampy. The greater part of the lands at Point Fortin is low-lying and swampy; a small portion hilly.

In all these places coconut and cocoa is grown; the former cultivations are found especially near the sea. At Guapo large areas are planted with timber. Point Fortin is an oil centre, and boring for oil is chiefly carried on, especially in the low-lying parts. Large areas are still in forest, and at Point Fortin and Cap-de-ville for miles the road runs through forest.

Soil.

The soil at Cap-de-ville, especially at Buenos Ayres Village, is sandy. At Guapo, Point Fortin, Chatham and Irois the soil for the greater part is loamy; in some parts it is clayey. In the whole district 1 or 2 ft. below the surface is a stratum of clay.

Drainage.

Many rivers, ravines, &c., are to be found in the villages, especially at Point Fortin and Guapo. The majority of borrow-pits at sides of roads are used as drains, many about 5 ft. wide and about 3 to 4 ft. deep. Many other smaller drains about.

In the cocoa and coconut fields, especially in the low-lying parts, many drains are to be found, and in some places they are about 12 ft. apart. Very little attention is paid to the proper grading of the different watercourses, and a very heavy shower is required to flush them; they are all sure breeding-places of Anopheles.

Remedial Measures.

The borrow-pits and drains should be regularly cleaned and graded; those without outlet should be filled in or opened. In dealing with the low-lying and swampy lands draining and filling in would be good. If rivers and ravines were to be regularly cleaned and graded by the different persons through whose land they pass, it would help greatly to lessen the breeding-places of Anopheles. The useless ponds and wells should be filled in; the necessary ones should be kept in good order by cleaning their sides and removing shade so that the sun could get to the water. At Point Fortin the great majority of borrow-pits and ponds and ravines have a film of oil on the surface of the water, and if all the collections of water were kept in such a way there would be few breeding-places about this village.

This could be arranged without great expense as the oil is there, and in many places is running to waste. I advised all the landowners to attend to all collections of water on their lands, but only in one case I found work was done; perhaps many of the others also did work, but I was unable to pass back to the different places to ascertain what was done.

General Remarks.

At Irois and Chatham I was surprised to find so few Anopheles larvæ in the different places searched.

About the bushes and in the houses the adult *Anopheles albipes* are the most common mosquito to be found, and are troublesome during the day as well as the night; it is the first place I saw adults about so common at all hours of the day. Many springs are to be found with a pool near by, and they are all kept in bad order.

When I expressed my surprise on seeing so many Anopheles about, I was told by the people that the season is out and that there is no need for nets now, but during the months of June, July, and August every house has to be closed between 5 and 6 p.m., and pitch or coconut husks must be kept burning to make a smoke to keep away the pests. In the district drains at sides of roads and pools hold water for many days after rain, and at Irois and Chatham each landowner has a well or pond on his land from which water is obtained. In a great many ponds, drains, borrow-pits, &c., in the district I noticed that a film of some oily substance is to be found on the surface of the water, and in such places I very seldom found Anopheles larvæ.

The sub-district of Erin includes the following villages: Erin, Pepper, Los Bajos, Palo Seco, Caratal, Los Charos.

Physical Aspect.

The northern and part of the southern side is hilly for the most part. In the other parts are wide, low-lying areas, with hills here and there.

A great portion of the land to the southern and part of the eastern side is in forest; the other parts are chiefly planted with cocoa, with wide areas in the low-lying parts in Para grass.

Soil.

The soil in the greater part of the district is clayey. About Palo Seco it is loamy, and a portion of the low-lying part to the south-western side of Erin village is alluvial.

Drainage.

The district is drained by the Erin River, and its many branches fed by many tributaries. These tributaries are merely ravines, and they only hold water during the wet season. The made drains in the cocoa fields hold water during the wet season for about ten to twelve days; if there is one shower during the week water remains for about two to three days. At the sides of the roads are borrow-pits and large drains, and they all retain water for a sufficient number of days to breed mosquitoes. A large drain and the Erin River run through the low-lying parts in the Erin village.

General Remarks.

The chief breeding-places in this district are the borrow-pits at sides of road; in some cases they are used as drains, but in the great majority of cases they simply serve to hold water for the breeding of mosquitoes. Although I searched many parts of the river and many ravines I was unable to find Anopheles larvæ. The surface of the water in the water hole on Collignon land was partly covered with duck-weeds, and fishes were plentiful (millions and guabins); duck-weeds are ideal sheltering places for the Anopheles mosquito larvæ, and in such places larvæ will certainly be found together with the fishes.

Colonial Medical Reports.—No. 78.—Durban.

REPORT TO THE DURBAN CORPORATION FOR THE MUNICIPAL YEAR ENDED JULY 31, 1916.

By P. MURISON, M.D., B.Sc., D.P.H.

Medical Officer of Health.

Population.

The following table shows the estimated population for 1916:—

Europeans	36,400
Coloured	3,100
Asiatics	19,400
Natives	20,800

Births.

Europeans, 921; natives, 9; Asiatics, 667.

Legitimate and Illegitimate Births, excluding Imported Births, 1915-1916.

	Males	Females	Total
Legitimate ...	444 ...	448 ...	892
Illegitimate ...	13 ...	16 ...	29
	457	464	921

Marriages.

During the past municipal year 494 European marriages were contracted in Durban.

	Males	Females
Of whom one party domiciled in Durban ...	17	64
Of whom both parties domiciled in Durban	368	368
Of whom neither party domiciled in Durban	45	45

Gross marriage-rate for Durban ... 12·5 per 1,000
Corrected marriage-rate for Durban ... 11·4 ,,

Deaths during the past Year.

Race	Males	Females	Total
European ...	191 ...	160 ...	351
Native	106 ...	39 ...	145
Asiatic	103 ..	77 ...	180
Totals ...	400	276	676

An increased amount of interest in Durban has been taken in connection with the subject of infantile mortality during the past year. Towards the end of this municipal year a "Child Life Protection Society" was inaugurated under the presidency of Her Excellency Lady Buxton, and this was followed by the Town Council resolving to appoint a lady sanitary inspector for the year 1916-17.

The serious causes of deaths amongst infants are those related to diarrhœa and other diseases of the digestive system. During the past eleven years, out of a total of 832 infant deaths, 348 have had their source of origin in the alimentary tract. Premature births, congenital malformations, injury at birth, and conditions generally which precluded the infant having a proper start in life's race numbered during the period 288 deaths. Diseases of the respiratory passages amounted to 67 deaths and infectious diseases to 88 deaths. The remaining 49 deaths were distributed amongst twenty different certified causes of deaths, giving an average of 2·45 deaths per disease.

With these facts before us, it is possible to determine to some extent the direction to pursue in order to combat the infantile mortality as it exists in Durban. So far as the deaths from diseases of the digestive system are concerned, it will be noticed that a very large proportion is certified as due to enteritis. Now enteritis means that some substance has obtained entrance into the stomach and intestines of an infant, which has produced such a degree of irritation there that death has been the result. We have no means of knowing how many more children have suffered from such a condition, but in whom the disease has stopped short of a fatal result.

From careful inquiries made during the years 1906 and 1907, it was found that European babies reared on the breast alone were practically exempt from enteritis and other intestinal diseases. It was found that from all causes of infantile deaths those reared by hand died in the proportion of ten to one, as compared with the breast-fed infant, and during the year 1906-1907 only one breast-reared infant died from enteritis.

The striking difference between the mortality of breast- and hand-fed infants in Durban only corroborates what is found in other communities, and carries with it a definite remedial principle, viz., that health visitors should emphasize and re-emphasize the necessity for mothers to suckle their infants on every possible occasion. An erroneous impression has developed that the modern woman is less able to breast-feed her infant than previous generations; this idea requires to be combated. Health visitors have done splendid work on this point in Great Britain. They have, by their advice, enormously increased the average number of breast-fed infants, with a corresponding decrease in the artificially-fed.

When artificial feeding is or has to be resorted to, danger to the life of the infant is continually present, particularly from diarrhœa. Milk being the principal food of an infant, the importance of this being kept in a state of purity will be evident. Contamination of milk is liable to take place at the cowshed, en route to the consumer, and at the home supplied. No by-law can be too stringent which aims at the prevention of impurities obtaining access to milk supplies at the place of pro-

duction and during transportation. The Borough of Durban only recently acquired powers to make standards for this purpose. The onus of preventing contamination in the home must rest with the householder, but the lady health visitor must draw suitable attention to the necessity for such being carried out and advise as to the best methods of so doing.

Unfortunately, investigations have shown that want of knowledge regarding infant feeding on the part of the mother has been a potent factor in maintaining a high rate of infantile mortality. Advice tendered by well-meaning but equally ignorant individuals has assisted towards this result. It is therefore necessary that facilities be afforded to instruct mothers and expectant mothers in sound principles of child life and infant hygiene. For such work it is essential that the services of a skilled woman be obtained. She must possess (1) tact, (2) be trained in the nursing of infants, and (3) have a knowledge of midwifery and sanitation.

One point of general interest in connection with the birth statistics is that over the period 1906-1916, 308 more males than females were born, and that 174 more males than females died, the first year of life tending very largely towards equalization of number of the sexes. Were the sex mortality followed up during the succeeding years, it would be found that the increased mortality among males still continues until in a few years the females predominate, and this is maintained to the end of life.

Further, it may be mentioned that out of a total of 258 deaths occurring during the first four weeks of life, 154 took place during the first week of infant life.

It will thus be seen that over 30 per cent. of the deaths occur during the first month of life, and that with each succeeding month from the first to the twelfth the tendency is for the deaths to decrease.

One outstanding fact can be deduced from such figures, and that is that a large number of infants are born unfit to survive. The chief causes of death during this period are premature birth, congenital debility and injury at birth. The proximate causes that have produced such results have undoubtedly been acting on the child before its birth. It will, therefore, be seen that in order to satisfactorily take up the matter of infantile mortality, it is not sufficient to deal with the infant after birth only, and that where conditions and circumstances warrant it, agencies must be in operation to give assistance and advice to expectant mothers previous to the birth of the child.

Another point of importance requiring recognition is that of efficient attendance at the mother's confinement, and here let me state that none of the deaths recorded come under the heading of still-births. These have in the past constituted in all communities a considerable number of deaths, many of which might possibly have been prevented with proper and skilled attendance on the mother. In order to deal with this phase of the question legislation is desirable. All midwives practising in a community should be under the direct supervision of the Health Department of such a community, and when from poverty the mother is unable to provide such skilled assistance the community must provide it.

Infectious Diseases.

Small-pox.

Towards the end of May, 1916, small-pox was stated in the daily press to have made great strides in the Lichtenburg district, where it had been epidemic for at least two months, 2,000 cases having been reported. Early in June a serious outbreak was discovered in Krugersdorp, where several Europeans had been attacked, and later in the month cases were reported from Potchefstroom, infection being believed to have been brought from Mafeking district.

In June, 1916, a case of small-pox was discovered within the borough at the African Boating Company's barracks in Point Road. The patient, a native, arrived in Durban from Mafeking on June 21, 1916. He complained of feeling ill on the journey, and the day before his arrival in Durban signs of a papular eruption were noticed on him. He went to work on June 22, but was feeling too ill the day following to continue his duties. He was seen by a doctor on the 27th idem, by which time a vesicular eruption had fully developed, and was characteristic in distribution. On the 28th idem the contents of the vesicles were pustular. The date of infection can thus be fairly traced back to June 6, 1916, on which date this native was in Mafeking. The patient was taken to hospital on June 27, and those who had been in direct contact with him, more particularly his fellow-travellers from Mafeking, were removed and segregated for sixteen days, while the other occupants of the premises above mentioned, about 800 natives and 400 Indians, were immediately vaccinated or re-vaccinated and the barracks disinfected. Arrangements were made with the employers of these labourers that they were to be kept under strict surveillance for eighteen days, and that under no conditions whatever were they to permit them to leave their work or the premises until after the expiry of that period. The patient had a moderately severe attack, and he recovered and was discharged after eight weeks in hospital. He stated he had never been vaccinated, and there were no signs of any previous vaccination on him. The medical profession in Durban were circularized of the occurrence of this case, in order that they might be on the outlook for others when any suspicious case came to their notice.

Up to Jnly 31 no further cases have occurred.

Diphtheria.

Anti-toxic serum is given by this department to medical men free of charge for the use of necessitous cases. Serum is administered in all cases

immediately on admission to the Municipal Infectious Diseases Hospital, the quantity being regulated by two factors, the day of the disease and the extent of the tissue involved. Bacteriological examinations of 735 specimens of swabs were made during the year, of which 524 gave negative results and 211 positive. It is necessary in the case of scholars and teachers affected with diphtheria to have three successive swabs proved negative by bacteriological examination before a clearing certificate to resume school attendance can be granted by this department. Among the patients admitted to the Infectious Diseases Hospital last year, there were five members from one family who were suffering from this disease at or about the same time. The first case had been mild and overlooked until the others were infected and showed more serious signs and symptoms. It is difficult at times to diagnose clinically mild cases of the disease, but bacterioscopic examination is both speedy and conclusive as to such cases being either positive or negative. During the year there were twenty cases notified which had not been confirmed by bacteriological examination. In several cases the germs have persisted in the throats of convalescents for considerable periods, when to all appearances the patient had quite recovered. As periodic visitations for the purpose of taking swabs became irksome to the doctor and expensive to the patient, arrangements have been made for the lady sanitary inspector to be appointed to assist in this work. It has to be remembered, however, that the doctor's duty to the patient and the household cannot be considered completed until the throat of the sufferer is free from the disease. One case sent in to hospital as diphtheria was found on arrival to be scarlet fever. The nurse fortunately recognized the disease and at once removed the patient to the scarlet fever pavilion. No cross infection resulted.

Scarlet Fever.

There have been fewer cases of scarlet fever during the past year than for the three preceding years, and during the past six years not a single death has occurred.

During the past year the following non-notifiable infectious diseases have been very prevalent in Durban, viz., measles, whooping-cough, chicken-pox, influenza, &c. It is impossible even to estimate the number of cases of these diseases that occurred, but chicken-pox and measles were extremely rife for part of the year. Statistics show that there were five deaths from measles, five from whooping-cough, and four from influenza.

TUBERCULOSIS BUREAU.

The following are the figures for the number of new patients examined at the Bureau during the past year ending July 31, 1916: Europeans, 98; coloured, 14; natives, 24; Asiatics, 41; attendances by old cases, 227; total, 404.

During the year twenty-five fresh cases of pulmonary tuberculosis amongst European burgesses of the borough have been notified as compared with twenty-eight in the previous year.

Of the new cases, the following number were found to be suffering from pulmonary tuberculosis: Europeans and coloured, 42; natives, 11; Asiatics, 7; total, 60.

The remainder in each case were either negative cases or cases requiring observation.

At first sight the number of positive cases, 60 out of 177 new cases examined, would appear to be unusually high, but it must be remembered that they are selected cases for the most part, many being sent on to the Bureau by practitioners. In some instances they are known to be suffering from tuberculosis, and suggestions are asked for as to treatment; in others aid in diagnosis is sought.

The need for sanatorium accommodation for patients suffering from pulmonary tuberculosis still remains a pressing one before the full value for the work done at the Bureau can be obtained.

WATER EXAMINATIONS.

In addition to the routine bacteriological examinations above detailed, there has this year been undertaken the examination bacteriologically of a considerable number of samples of the Durban water. These examinations were commenced in November, 1915, and the samples have been taken from various parts of the water system both inside and outside the borough. Many laboratory experiments have also been carried out as a necessary preliminary and adjunct to these tests. In all sixty-four samples have been examined during these nine months, and the results will be shortly completed.

Colonial Medical Reports.—No. 79.—Bihar and Orissa.

REPORT OF THE PATNA LUNATIC ASYLUM IN BIHAR AND ORISSA, WITH BRIEF NOTES FOR THE YEAR 1916.

By G. H. BELL, C.I.E., M.B.

Superintendent, Lunatic Asylum, Patna.

Ranchi Secretariat, May 5, 1917.

THE high rate of mortality at the asylum as compared with that at other provincial asylums was noticed last year by His Honour in Council, and a full report on the probable causes with proposed measures for improvement was submitted by me in my letter dated November 8, 1916, after a thorough inspection of the institution. The death-

rate for the year under report shows some improvement as compared with that of the previous year. As a result of these inquiries, steps are being taken to attempt to improve, as far as practicable, the sanitary and conservancy arrangements, as also other structural deficiencies, which are removable at a moderate cost. The establishment at Ranchi of the proposed central asylum for Indian insanes from Bengal and Bihar and Orissa and the consequent abolition of the Patna institution must necessarily limit further avoidable expenditure on the latter.

The proposal for the appointment of a civil assistant surgeon as Deputy Superintendent of the asylum has recently been sanctioned by the Local Government. The scale of pay of the keeper staff has been substantially raised with effect from March 1, 1917, and this with the introduction of a system of security deposit are measures calculated to increase their efficiency in future. It has been found difficult, or rather impossible, to check the practice of the asylum staff of sweepers working simultaneously under assumed names for the local municipality. This matter is one in which the co-operation of the Municipal Commissioners is essential.

The new *Bihar and Orissa Asylum Manual* is now under the consideration of the Local Government.

At the commencement of the year there were 268 males, forty-one females, or a total of 309 inmates under treatment in this asylum. The average daily strength was 310·03. The number admitted during the year was fifty-nine males and thirteen females, the figures representing re-admissions being twelve males and four females. Those discharged numbered fifty-one males (including one case of escape), nine females; and the deaths were thirty-two males and three females. The net decrease in the population was, therefore, seven only, the males having decreased by twelve and the females increased by five. Of those discharged, twenty-five males and three females were cured; eight males and two females were made over to their friends in improved condition; one escaped; and seventeen were discharged otherwise from the asylum. The percentage of those cured to the daily average strength was 9·03, and to admissions 31·81, against 11·73 and 37·37, respectively, in the previous year.

The capacity of the asylum is 356 (for males 290 and for females 66). The capacity for male criminal lunatics is still inadequate, but this defect will be removed as soon as the new criminal ward, which is in course of construction, is completed.

Sickness and Mortality.

There were 401 patients treated in the hospital during the year 1916, 336 males and 65 females. The daily average sick was 23·06 as compared with 22·61 in 1915. The important admissions were for dysentery, forty (fourteen amœbic and twenty-six bacillary); pyrexia of uncertain origin, thirty-five; ankylostomiasis, seventy-three; conjunctivitis, seventeen; tuberculosis, ten; diarrhœa, twenty; abscess, thirty-one; injury on scalp, twenty-five; kala-azar, two; diseases of the respiratory system, twelve; anæmia of unknown origin, two. Whenever possible the diagnosis was verified by microscopic examination. The increase in the number of patients this year is due to a large number of admissions for ankylostomiasis, injuries, pyrexia of uncertain cause and dysentery. Repeated admissions of some of the cases is partly responsible for this increase.

The total mortality was thirty-five, as compared with forty-one in 1915, i.e., 112·89 per mille, as compared with 130·08. The mortality was 24·94 per mille for the Patna Municipality.

The causes of death as verified by post-mortem examination were:—

	Male	Female	Total
Ankylostomiasis	18	2	20
Tubercle of the lung	9	1	10
Kala-azar	1	0	1
Empyema	1	0	1
Dysentery	1	0	1
Bright's disease	1	0	1
Œdema of the lung	1	0	1
Total ...	32	3	35

Five chronic cases were taken over from the previous year. Out of seventy-nine admissions, fifty-nine were received in bad health and four in indifferent health, of whom ten died. Eating of mud, fæces and grass were specially frequent during the year. Dysentery, diarrhœa and ankylostomiasis may be attributed to these causes acting before and after admission. A routine examination of excreta, blood and sputum was made in all cases. The excreta of 388 (old 309 + new 79) were examined with the following results:—

	Per cent. Old patients	Per cent. New patients	Per cent. Total
Ova of Ankylostoma	58·90	72·15	61·60
,, Ascaris lumbricoides ...	79·61	63·29	76·29
,, Trichocephalus dispar ...	56·96	36·59	52·84
,, Tape worm	1·29	*nil*	1·03
,, Oxyuris vermicularis ...	2·26	5·06	2·84
Strangulóides rhabdomenis ...	5·18	3·80	4·90
Amœbæ	12·94	21·52	14·69
Trichomonas	22·33	22·78	22·42
Balantidium coli	13·91	11·39	13·40
Tubercle bacillus	2·09	3·80	3·09

Criminal Lunatics.

There were 147 criminal lunatics in the asylum on January 1, 1916. The number of patients of this class admitted and re-admitted during the year was fory-two, of whom thirty-six were males and six females; twenty-six males and one female were discharged or transferred and seventeen males died, leaving 131 males and fourteen females, or a total of 145 criminal lunatics under treatment at the close of the year. The daily average strength was 145·28 in 1916, against 145·26 in 1915. There has been no undue detention of criminal lunatics convicted of trivial offences, as the number of this class was reduced as far as possible in pursuance of the orders of Government enjoining release of such classes.

Colonial Medical Reports.—No. 79.—Bihar and Orissa *(continued.)*

RELIGION, SEX AND RESIDENCE.

Out of sixty-nine admissions and re-admissions during the year, Hindus contributed fifty-nine, Mohammedans four, Christian one, and the rest were of other castes. In some of the cases the castes were not known.

OCCUPATION.

Out of a total of sixty-nine admissions and re-admissions, cultivators furnished nineteen, labourers six, beggars six, servants three, and clerk one. The rest belonged to various other callings.

AGES.

Out of sixty-nine admissions and re-admissions, five were under 20, forty-seven were between 20 and 40, and sixteen were between 40 and 60. There was only one admission upwards of 60 years of age.

TYPES OF INSANITY.

Mania in its various forms was the common type of insanity, for which twenty-four patients were admitted and ten recovered. Dementia with ten admissions comes next in numerical importance. The number of recoveries under this type was five. Insanity caused by Cannabis Indica or its preparations or derivatives accounts for eight admissions with two recoveries. Four cases were admitted under head, Delusional Insanity with no recovery. Mental stupor was responsible for two admissions. Possibly the five cases of recovery from dementia should come under this head. No recovery under this type. There were two admissions and three recoveries under Melancholia. Two cases were admitted under head "Idiocy" with no recovery.

ÆTIOLOGICAL FACTORS.

The ætiological factor in two cases was heredity, in two cases mental instability, in one deprivation of special senses, in two child-bearing, in seventeen mental stress, in three physiological defects and errors, in thirty-seven cases toxic, and in six diseases of the nervous system. No causes were either assigned or ascertained in twenty-eight cases. (In twenty-nine cases, twenty-five males and four females, there were both exciting and predisposing causes, thus accounting for a total number of ninety-eight against sixty-nine new admissions.)

FINANCE—EXPENDITURE.

The total receipts under all heads aggregated to Rs. 35,397, against Rs. 63,478 in 1915, and Rs. 43,566 in 1914. The decrease is partly due to the falling off in the average strength, but chiefly to less expenditure on public works, diet, and contingent charges.

The comparative charges for 1915 and 1916 were:—

	1915 Rs.	1916 Rs.
Establishment	12,274	12,634
Contingencies...	5,670	2,354
Medicines	723	750
Clothing and Bedding	2,917	4,434
Diet	26,027	13,723
Works done by Public Works Department	15,311	3,201

The average cost per head, including expenditure on manufacture, was Rs. 113-13-6, as compared with Rs. 200-2-11 in 1915.

The general conduct of the staff was indifferent. Only an inferior class of men can be obtained on the present rate of pay. They shirk duty and are dishonest in other ways.

The lunatics are employed in gardening, "atta" and "dal" making, carpentry, and smith's work, &c. Newspapers and books were provided to literate lunatics.

GENERAL REMARKS.

Amusements were provided at a cost of Rs. 41-8-0. The system of rewarding hard-working and well-behaved lunatics continued during the year. Quinine as a prophylactic was issued to the lunatics during the unhealthy season of the year. A new ward for criminal males with forty beds is under construction. When this is completed the overcrowding in the male criminal ward will be removed.

C. E. SUNDER, M.D., Lt.-Col., I.M.S.,
Superintendent Lunatic Asylum, Patna.

Colonial Medical Reports.—No. 80.—Grenada.

MEDICAL REPORTS ON THE CHARITABLE INSTITUTIONS, &c., FOR THE YEAR 1916.

By E. F. HATTON,

Colonial Surgeon.

THE colony suffered during the year from a shortage of medical practitioners. Since the War commenced we have lost six doctors, and only one of these has been replaced. During the year one medical officer, Dr. Claude Hughes, died, and three other district medical officers were incapacitated by illness.

PUBLIC HEALTH.

The health of the colony was much above the average for the year, the total deaths amounting to 1,280, as compared to 1,744 for last year; the births were 2,602, last year 2,415.

The death-rate was 17·50, as compared to 24·36 in 1915. The death-rate for this year is probably the lowest on record for the colony.

The birth-rate was 35·60, as compared to 33·74 for the previous year.

Carriacou leads the way with a death-rate of only 9·70.

Malaria.—This disease was fairly prevalent during the latter months of the year, but was not of a severe type. The number of deaths recorded as due to this disease was 103, as compared to 147 for the previous year.

No extensive anti-malarial measures were undertaken during the year, but the sanitary inspectors did good work by keeping drains open by the use of oil and "millions."

Quinine was given free of cost to all persons suffering from malaria if they belonged to the labouring class.

The detachment of the West Indian Contingent stationed at the Quarantine Station suffered considerably from this complaint during the months of August, September, and October.

Dysentery.—This disease was not very prevalent during the year. There were 88 deaths, as compared to 341 in 1915 and 297 in 1914. This has had a marked effect in reducing the general death-rate.

The other principal causes of death were: Enteritis and diarrhœa, 274; tuberculosis, 60, syphilis, 50; heart disease, 53; diseases of the kidneys, 55.

Yaws.—There were 218 cases admitted to the Yaws Hospital this year, as compared to 605 last year. This does not mean that there has been a great decrease in the prevalence of the disease in the colony; it means that for some reason or other fewer cases were sent to the hospital. The difficulty of transport seems to be one of the chief reasons for not going into hospital. This is particularly the case with regard to young children, their mothers being unwilling to be separated from them for so long a time, often three or four months.

When salvarsan becomes more easily obtained the length of stay in hospital will be greatly reduced. The number of cases so treated this year was twenty.

NOTIFIABLE DISEASES.

Typhoid.—There were twenty-seven cases of this disease notified during the year, as against twenty-four last year. Of the twenty-seven notified this year ten were males and seventeen females. There were six deaths recorded from this disease.

Leprosy.—Two cases were notified, both males. The number of cases known to be in the colony is sixteen.

The colony is still without any proper provision for isolating persons suffering from this disease. Pauper cases are given an allowance for food, and efforts are made by the sanitary inspectors to keep them away from the markets and public places.

Tuberculosis.—This disease has been notifiable since July 1, 1913. The number of cases notified this year was fifty-five—males, twenty-three; females, thirty-two.

Ankylostomiasis.—The International Health Board of the United States has been conducting a campaign against this disease since August, 1914.

Work during the year was confined chiefly to the parishes of St. Andrew and St. John, together with some few treatments at the head office in the parish of St. George.

I am indebted to the kindness of Dr. Colwell for the following figures: Number of persons examined, 7,218; number of examinations, 16,356; number infected with hookworms, 5,810; number of first treatments given, 5,449; total number of treatments given, 19,913; number of persons cured, 1,661; percentage of infected cured, 28·6.

Pellagra.—There were two cases of this disease in the lunatic asylum, and two deaths were registered in the colony during the year.

Tetanus.—There were twenty-four deaths from this complaint.

Vaccination.—The vaccination of infants has been thoroughly carried out throughout the year. The infant population of the colony is fairly well protected against small-pox, but this is not the case with the adult population. In the event of small-pox being introduced into the colony re-vaccination will be necessary.

RETURN OF DISEASES AND DEATHS IN 1916 IN THE COLONY HOSPITAL, YAWS HOSPITAL, CONSUMPTIVE HOSPITAL, CARRIACOU HOSPITAL AND ST. ANDREW'S DISTRICT HOSPITAL.

Grenada.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	3	—	3
Anæmia	—	—	—
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	41	—	41
Congenital Malformation	—	—	—
Debility	—	—	—
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	1	—	1
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	45	6	45
Enteric Fever	17	5	22
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	—	—	—
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	2	—	2
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	—	—	—
(*c*) Mixed	—	—	—
Malarial Fever—	142	—	156
(*a*) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	—	—	—
(*c*) Pernicious	—	—	—
(*d*) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	—	—	—
Old Age	—	—	—
Other Diseases	266	6	305
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	1	1	1
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	48	—	48
Rheumatoid Arthritis	5	—	10
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	—	—	—
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	71	13	72
(*a*) Primary	—	—	—
(*b*) Secondary	—	—	—
(*c*) Tertiary	—	—	—
(*d*) Coogenital	—	—	—
Tetanus	4	2	4
Trypanosoma Fever	—	—	—
Tubercle—	1	1	1
(*a*) Phthisis Pulmonalis	34	20	43
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—
GENERAL DISEASES—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	2	1	2
Varicella	3	—	3
Whooping Cough	—	—	—
Yaws	218	4	318
Yellow Fever	—	—	—

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	—	—	—
Circulatory System	9	—	9
(*a*) Valvular Disease of Heart	24	7	30
(*b*) Other Diseases	20	—	20
Digestive System—	2	—	4
(*a*) Diarrhœa	—	—	—
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	10	1	10
Congestion of Liver	—	—	—
(*d*) Abscess of Liver	2	2	2
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	—	—	—
(*g*) Cirrhosis of Liver	3	1	3
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	33	—	33
Ear	3	—	3
Eye	41	—	45
Generative System—	—	—	—
Male Organs	119	5	119
Female Organs	57	2	62
Lymphatic System	16	1	16
Mental Diseases	—	—	—
Nervous System	31	—	33
Nose	2	—	2
Organs of Locomotion	2	—	2
Respiratory System	49	10	50
Skin—	—	—	—
(*a*) Scabies	—	—	—
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	1	—	1
(*f*) Other Diseases	—	—	—
Urinary System	63	10	71
Injuries, General, Local—	—	—	—
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(*c*) Other Injuries	—	—	—
Parasites—	—	—	—
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	58	—	63
Filaria medinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	2	—	2
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	—	—	—
Amputations, Major	13	—	13
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	—	—	—

No case of small-pox was reported during the year.

Quarantine.—No quarantinable disease occurred in the colony during the year, though some little anxiety was caused on account of reported cases of yellow fever in Barbados.

In the middle of the year the sanitary inspectors were placed under the control of the local sanitary authorities instead of under the colonial surgeon.

Sergeant Gatt, Sanitary Inspector, died in the latter part of the year. He had been many years in the Government employ, and was an efficient officer.

Latrines.—Strong efforts were made to improve the latrine system in rural districts, but no great progress was made.

Some of the Government primary schools and a few of the grant-in-aid schools have built suitable latrines, but much still remains to be done. Still less progress has been made in the matter of domestic latrines among peasants and labourers.

The building of public latrines in some of the villages is in progress or under consideration.

RETURN OF STATISTICS OF POPULATION FOR THE YEAR 1916.

Population at December 31, 1915	71,567
Net increase during 1916	1,322
	72,889
Excess of emigration over immigration ...	167
Estimated number of inhabitants at December 31, 1916	73,056

YAWS HOSPITAL.

The total number treated during the year was 318, as against 663 during the previous year; this great reduction is difficult to explain. To some extent it may be due to limiting the number of inmates to seventy, the number which the institution was intended to provide for. During the previous year the institution was often very much overcrowded. I have no evidence that the number of cases in the districts was less than in previous years.

The largest number of admissions were from the parishes nearest to the hospital. This would indicate that distance and difficulty of transport affected the admissions, and not that the disease was more prevalent in these parishes.

There were four deaths among the inmates, two from dysentery and two from nephritis. There was no death attributed directly to yaws.

The daily average in hospital was fifty-nine.

METEOROLOGICAL RETURN FOR THE YEAR 1916.

At Richmond Hill Meteorological Station in the South of the Island.

	Temperature						Rainfall		Winds	
	Solar minimum	Solar maximum	Shade minimum	Shade maximum	Range	Mean tension of vapour	Amount in inches	Degree of humidity	General direction	Average force
					a.m.	a.m.		a.m.		
January	128	135	72	82	6	0·711	4·20	74·0	E	130
February	129	136	72	83	6	0·691	2·63	73·0	E	150
March	129	136	72	84	6	0·709	2·74	71·0	E	144
April	127	136	74	86	6	0·737	1·88	70·0	E	147
May	127	135	75	86	7	0·773	3·52	72·0	E	148
June	120	135	74	85	5	0·797	7·13	76·0	E	140
July	120	135	75	85	5	0·796	10·23	74·0	E	137
August	10[illegible]	134	74	86	4	0·822	7·60	78·0	E	115
September	119	135	74	86	4	0·832	11·32	78·0	E	119
October	98	135	75	85	4	0·837	4·57	78·0	E	152
November	120	134	73	83	4	0·830	15·10	81·0	E	139
December	123	134	72	83	6	0·677	6·04	70·0	E	144
Averages	120	135	73	84	5	0·767	6·41	74·0	E	139

Colonial Medical Reports.—No. 81.—Saint Vincent.

ANNUAL REPORT FOR THE YEAR 1915-16.

By CYRIL H. DURRANT, M.B.,

Colonial Surgeon.

KINGSTOWN.

VITAL STATISTICS.

THE Registrar-General's returns show that the estimated population of the colony on March 31, 1916, was 47,818.

The total number of births was 1,724. Males, 890; females, 834.

Stillbirths, 100.

The birth-rate was 36 per thousand.

The total number of deaths was 785, excluding stillbirths. The death-rate was 16·4 per thousand.

REMARKS ON PARTICULAR DISEASES, &c.

Malaria.—This disease has been more prevalent in the Kingstown No. 1, No. 2 and No. 3 Districts than in the other medical districts. It is located chiefly in the districts surrounding Kingstown, extending easterly to the Calliaqua Mesopotamia district and westerly to Clare Valley, and has been more prevalent than usual in the past two years. There is probably a close relation between this increase and the return of labourers from South American countries. Quinine has been distributed freely in the affected areas, and in the Clare Valley stream, "millions" imported from Barbados, have been placed with the hope of reducing the number of anophelines. No special anti-malarial works are to be recorded.

The district medical officers, whose reports are appended, all draw attention to the prevalence of yaws, infantile diarrhœa, and syphilis, while slowly but surely pulmonary tuberculosis asserts its presence, 158 cases being recorded with thirty-six deaths. Measures are under consideration for the more effective treatment of these diseases, which will be reported on at a later date. Catarrhal fevers, of epidemic influenza type, were particularly common throughout the year in all medical districts, 1,533 cases with fifty-nine deaths being noted.

ANKYLOSTOMIASIS (HOOKWORM DISEASE).

The campaign against this disease was begun on May 1, 1915, with funds generously provided by the International Health Commission.

Dr. W. P. Jacocks, the Medical Officer in charge, arrived at the end of April, and the campaign on the "intensive system" was commenced in the Calliaqua district.

Early in November Dr. Jacocks left the colony to act as director of a similar campaign in Trinidad. He was succeeded by Dr. P. B. Gardner.

The following table shows the work done up to the end of the year:—

ANKYLOSTOMIASIS CAMPAIGN REPORT FOR YEAR ENDING MARCH 31, 1916.

Census	5,702
Examined	5,669
Positive to *Ankylostomum duodenale*	2,791
Negative ,, ,,	2,878
Treated	2,620
Cured	2,169

EDUCATIONAL WORK.

	Number	Attendance
Lecture to schools	8	937
Public lectures	4	1,200

In addition the sanitary preventive work of providing "fly-proof latrines" and closets of an approved pattern has proceeded, in spite of difficulties, with commendable speed.

PUBLIC HEALTH.

The work of the Government Sanitary Department and the inspections carried out during the year by the Government sanitary inspector form the subject of a special report, which is appended.

HOSPITALS AND ASYLUMS.

The reports of the medical officers in charge of these institutions are attached.

The total number of persons treated in the hospitals and asylums of the colony for the year was 1,324.

The number of attendances returned under the Medical Relief Scheme was 17,865. This return includes paupers, labourers, labourers' children under 10 years of age, police constables, and prisoners at police stations.

A summary of the diseases and deaths in the medical districts is appended.

REPORT OF THE MEDICAL OFFICER, KINGSTOWN DISTRICT.

COLONIAL HOSPITAL,
ST. VINCENT.

VITAL STATISTICS.

The population of the district, comprising the town of Kingstown and adjacent village of Edinboro, is estimated at 5,000 persons.

There were 124 births and fifty-seven deaths,

giving a birth-rate of 24·8 per thousand and a death-rate of 11·4 per thousand. There were twelve still-births recorded.

The deaths at the Colonial Hospital are not included in the above figures, but are accounted for in the report on that institution.

The total number of deaths, including those at the institutions, was 128, four more than the total number of live births.

The following table shows the birth-rate and death-rate per thousand for the past five years:—

Year	Births	Deaths[1]	Birth-rate per 1,000	Death-rate per 1,000	Stillbirths
1915-16	124	57	24·8	11·4	12
1914-15	201	66	40·2	13·2	18
1913-14	185	69	37	13·8	9
1912-13	161	89	32·2	17·8	22
1911-12	187	81	39·7	17·2	18

[1] The deaths at the Colonial Hospital are not included.

The striking feature portrayed by these figures is the abnormal fall in the birth-rate.

Relative Mortality in the Different Seasons.

		Cases	Deaths
1915	April—June	982	17
	July—September	1,398	18
	October—December	1,348	9
1916	January—March	1,231	13

Sickness was therefore more prevalent from July to December with a lower death-rate than in the first and last quarters with a higher death-rate.

Remarks on Particular Diseases, &c.

Of notifiable diseases recorded there were twenty-nine cases of "whooping-cough," forty-four cases of yaws, fifty-one cases of pulmonary tubercle with five deaths, and one case of leprosy. Among "other diseases" there were 444 cases of "catarrhal fever" (influenza) with three deaths, ninety-six cases of infantile diarrhœa with thirteen deaths, 157 cases of syphilitic disease with eight deaths, and eleven cases of amœbic dysentery.

One hundred and fifty-eight cases of malaria with one death were recorded, as against 179 cases in the previous year.

The sanitary condition of the town has on the whole been fairly well maintained, due attention being paid by the sanitary inspectors of the local authority to the prevention of mosquito-borne diseases. Attention must, however, be again drawn to the necessity for organized action in freeing yards and compounds of all receptacles likely to contain water.

Vaccination has been regularly performed each week throughout the year, despite the difficulty of obtaining lymph regularly on account of the War and the impossibility of ensuring its transport on cold storage.

Report of the Medical Officer, No. 1 District.

Kingstown,
St. Vincent.

The population of the district is estimated at about 7,000 persons.

There have been 224 births, 135 deaths, and eleven stillbirths during the year, giving a birth-rate of 32 per thousand and a death-rate of 19·2 per thousand.

Catarrhal fevers were prevalent in the last quarter of the year, viz., January to March, 142 cases being recorded, as against 147 cases in the remaining nine months of the year.

Remarks on Particular Diseases, &c.

Catarrhal fevers (epidemic influenza) heads the list with 289 cases with sixteen deaths.

Chronic ulcers (other than syphilis and yaws) furnishes 182 cases. The diarrhœal diseases of children account for 114 cases with twelve deaths, while malaria provides 105 cases with three deaths. Of zymotic diseases, one case of chicken-pox and twenty-four cases of whooping-cough were recorded.

The general sanitary condition of the district has on the whole been very satisfactory throughout the year. Fortnightly inspections by a police sanitary officer and by the Government sanitary inspector have been regularly carried out. In the swamp, which forms at the mouth of the Clare Valley stream, owing to the low-lying land, "millions" imported from Barbados have been placed with the hope of reducing the incidence of malaria in this area.

The number of successful vaccinations performed during the year was 208. The lymph supplied gave excellent results.

Report of the Medical Officer, No. 2 District.

Peter's Hope,
St. Vincent.

Vital Statistics.

Year	Population	Births	Deaths	Stillbirths
1910-11	8,882	361	153	13
1911-12	9 090	354	146	18
1912-13	9,288	345	147	20
1913-14	9,516	366	138	25
1914-15	9,670	367	183	21
1915-16	9,852	332	150	14

The most noteworthy feature of the above table is the rapid decrease in the birth-rate during the last six years.

Diarrhœa and catarrhal fevers were most prevalent during the hot damp months of the year. On the incidence of other diseases the seasons had no effect.

Catarrhal fevers and diarrhœa prevailed to a greater extent during the hot wet season than in the drier and cooler season.

No disease occurred in epidemic form during the year.

RETURN OF DISEASES AND DEATHS IN 1915-16 IN THE COLONIAL HOSPITAL,

St. Vincent.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	3	—	3
Anæmia	—	—	—
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	19	3	19
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	—	—	—
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	5	1	5
Enteric Fever	3	1	4
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	12	—	12
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	6	—	6
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	—	—	—
(*c*) Mixed	—	—	—
Malarial Fever—	93	4	95
(*a*) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	—	—	—
(*c*) Pernicious	—	—	—
(*d*) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	—	—	—
Old Age	—	—	—
Other Diseases	8	1	8
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	7	—	8
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	9	5	9
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(*a*) Primary	1	—	1
(*b*) Secondary	—	—	—
(*c*) Tertiary	127	2	141
(*d*) Congenital	—	—	—
Tetanus	2	2	2
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—

GENERAL DISEASES—*continued.*	Admissions	Deaths	Total Cases Treated
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	—	—	—
Yaws	—	—	—
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	42	2	49
Circulatory System	3	1	3
(*a*) Valvular Disease of Heart	—	—	—
(*b*) Other Diseases	—	—	—
Digestive System—	—	—	—
(*a*) Diarrhœa	3	1	3
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	—	—	—
Congestion of Liver	7	1	7
(*d*) Abscess of Liver	—	—	—
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	—	—	—
(*g*) Cirrhosis of Liver	—	—	—
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	22	2	23
Ear	—	—	—
Eye	18	—	18
Generative System—	—	—	—
Male Organs	8	—	9
Female Organs	119	3	121
Lymphatic System	—	—	—
Mental Diseases	2	—	2
Nervous System	26	4	26
Nose	4	1	4
Organs of Locomotion	10	—	10
Respiratory System	31	4	32
Skin—	—	—	—
(*a*) Scabies	—	—	—
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	85	—	88
(*f*) Other Diseases	7	—	7
Urinary System	29	5	33
Injuries, General, Local—	52	4	58
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(*c*) Other Injuries	—	—	—
Parasites—	—	—	—
Ascaris lumbricoides	15	1	15
Oxyuris vermicularis	—	—	—
Doohmius duodenalis, or Ankylostoma duodenale	40	—	44
Filaria medinensis (Guinea worm)	8	—	9
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	1	—	2
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	153	1	153
Amputations, Major	—	—	—
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	1	—	1
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	34	—	34

Amongst "notifiable diseases" yaws and pulmonary tuberculosis claim attention.

Yaws.—169 cases applied for medical relief. There were no deaths. The number of cases registered represents but a small fraction of the cases existing in the district. This is indeed the most prevalent amongst diseases. The majority of sufferers, however, have a rooted objection to medical treatment. Although it is seldom fatal, it is a serious condition, for in its graver forms it accounts for a good deal of suffering, invalidism and pauperism.

Pulmonary Tuberculosis.—There were seventeen cases with six deaths. The disease is on the increase. Patients do not apply early for treatment, and most of them die of the disease sooner or later.

Amongst other disease diarrhœa in children and syphilis are the most prevalent. 311 cases occurred with thirty-five deaths. Amongst children under twelve months the chief cause is improper feeding, due partly to ignorance, but most to poverty. After twelve months, and often before, most of the children become infected with intestinal worms, and, in them, this is a great factor in the determination of diarrhœal attacks. Unhygienic surroundings are accountable.

Syphilis.—As usual this disease furnished a large number of cases and deaths.

The general sanitary condition of districts is satisfactory.

The number of successful vaccinations was 286. There were 332 births, leaving forty-six children to account for. The lymph used gave satisfaction.

Thirty-two cases of malaria were treated during the year, as against ninety-six last year and 114 the year before.

Report of the Medical Officer, No. 3 District.

Vital Statistics.—Estimated population, 10,721; births (exclusive of stillbirths), 325; deaths, 147; stillbirths, 40.

Sickness was most rife in the last quarter of the year under report, February being the worst month, both as regards sickness and mortality. Children's diarrhœa was especially rife in July and August.

Catarrhal fevers were very prevalent, especially in July, forty-two cases being registered. There were 203 cases for the year with a mortality of seven.

There were 145 cases of syphilis with thirty-three deaths. The majority of this was among children.

There were 139 cases of malaria, mostly benign tertian infections, with three deaths. The greatest number of cases occurred in February.

Children's Diarrhœa.—There were 140 cases of this trouble with a mortality of nine, sixty-three cases with six deaths being recorded in July and August alone.

There were 118 cases of whooping-cough with eight deaths; most of the cases were of a mild type. In July, August, September and October there were no cases. In January, February and March there were eighty-three cases with a mortality of seven.

Intestinal parasites were extremely prevalent, especially in children.

Dysentery.—There were 107 cases with fourteen deaths. Dysentery was present right through the year. The greatest number of cases occurred in May, being twenty-two.

Yaws.—There were ninety-nine cases; no deaths. A good number of these were sent to the Yaws Hospital for treatment.

Ankylostomiasis.—There were sixty-nine cases. The Ankylostomiasis Campaign is, however, in progress, and we hope ere long to show an appreciable decrease in the number of these cases.

Pulmonary Tuberculosis.—There were twenty-two cases with a mortality of seven.

The general sanitary condition of the district was satisfactory.

The total number of vaccinations successfully performed was 246. The lymph supplied gave uniformly good results.

Anti-malarial Measures.—Large bottles of quinine mixture were kept at Cane Hall, Gomea, and Mesopotamia to be distributed gratis to the malaria-stricken. The usual measures were undertaken as heretofore.

General Remarks.

The infant mortality, I believe, could be reduced. It is enhanced chiefly by improper nourishment and indifferent attention on the part of parents and guardians, due to poverty and lack of knowledge.

Taken all round the health of the district has been satisfactory. The mortality in relation to sickness is a little over 5 per cent.; in relation to population is a little over 1 per cent.

The sanitary inspectors have done their work satisfactorily, and the appointed stations were duly visited.

Report of the Medical Officer, No. 4 District. The Cedars.

Vital Statistics.—Estimated population of district, 6,000; number of births, 182; number of deaths, 113; excess of births over deaths, 69.

Whooping-cough prevailed in April, May and June, 1915; malarial fevers in April, 1915; mild catarrhal fevers in July-August, 1915; and again in February-March, 1916. Infantile diarrhœa in August-November, 1915.

The variable conditions of the weather attending the seasonal changes in July-August, 1915, and February-March, 1916, were accompanied by a mild epidemic of catarrhal fevers. Yaws seems to have been most prevalent in August and September, 1915, and in February-March, 1916.

Remarks on Particular Diseases.

Congenital Syphilis.—Ninety-one cases and forty-one deaths are recorded, evincing a case mortality of 45 per cent., and totalling 36 per cent. of the number of deaths for the period.

Colonial Medical Reports. No. 81.—Saint Vincent *(continued.)*

As a rule the infants are brought in very late for treatment, and it is almost impossible to get the parents to understand that treatment must be continuous and persistent.

Infantile Diarrhœa.—Fifty-six cases, ten deaths, mortality 18 per cent., and forming about 9 per cent. of total mortality.

Injudicious feeding and intestinal parasites contributed largely towards the prevalence of infantile diarrhœa.

Yaws.—118 cases (one death), the highest figure for any individual disease incidental to the district. Yaws appears to be widespread over the district, with foci at South Rivers, Park Hill, Spring Estate, Grants Village and Lowmans. Twenty-nine cases were sent to the Yaws Hospital for "salvarsan" treatment; these were discharged as cured. I have had them under observation, and I regret to have to report that no less than fifteen of these are now under treatment for crab-yaws, or recrudescence of eruptions. It is my experience that cases hastily discharged as cured sooner or later develop a most chronic form of the disease.

Tuberculosis (pulmonary).—Fifteen cases, seven deaths; 6 per cent. of total mortality for the period.

The general sanitary condition of the villages in the district were inspected periodically and found in a satisfactory condition.

There were 242 successful vaccinations; number of births for the period, 182.

No special anti-malarial and anti-mosquito measures were called for, as malarial fevers do not prevail to any appreciable extent in the district. Whilst the villages were being inspected attention was, as a rule, directed to clusters of trees under bush and collections of stagnant water. In no case was search rewarded with the discovery of larvæ, or mosquitoes known as fever carriers.

Report of the Medical Officer, No. 5 District.

Kingstown,
St. Vincent.

The population of the district is estimated at 4,500. There were 195 births and sixty-nine deaths, giving a birth-rate of 43·3 per thousand and a death-rate of 15·3 per thousand. There were three stillbirths recorded.

The highest mortality occurs in the first six months of the year—thirty-eight deaths as against twenty-six in the latter six months.

Of the cases applying for treatment, "catarrhal fevers" head the list with 107 cases with five deaths. Ulcerative conditions, other than those due to yaws or syphilis, provide 100 cases. Syphilis provides seventy-two cases with seven deaths, and the diarrhœal diseases of children fifty-two cases with eleven deaths. Malarial fever is comparatively rare in this district, only eight cases being recorded.

The general sanitary condition of the district was very satisfactory. The town of Georgetown is particularly well kept, and much credit is due to its town wardens. The various villages were inspected regularly every fortnight by a police sanitary officer and by the Government sanitary inspector.

One hundred and forty primary successful vaccinations were performed during the year. The lymph supplied gave uniformly good results.

The district enjoys the reputation of being a healthy one.

Summary of Diseases and Deaths in Medical Districts for the Year 1915-16.

	Number of cases	Number of deaths
Notifiable diseases—		
Chicken-pox	3	—
Cholera	—	—
Diphtheria	—	—
Enteric fever	—	—
Leprosy	3	—
Measles	—	—
Mumps	1	—
Plague	—	—
Small-pox	—	—
Whooping cough	269	9
Yaws	529	1
Yellow fever	—	—
Other diseases—		
Ankylostomiasis	273	6
Anthrax	—	—
Catarrhal fevers	1,527	53
Diarrhœa—adults	175	8
,, children	795	100
Dysentery	172	21
Filaria	64	3
Malarial fevers	482	7
Malignant new growths	36	11
Pulmonary tuberculosis	131	30
Syphilis	627	109
Tetanus	1	1
Ulcers (except syphilis and yaws)	854	—
Total number of other cases treated not enumerated above	11,973	233
Total	17,865	592

Report of the Chief Health Officer.

By Cyril H. Durrant, M.B., Chief Health Officer.

Sanitary Department,
Kingstown.

The public health of the colony has not been disturbed by any particular or important epidemic during the year. As noted in the Colonial surgeon's report, catarrhal fevers of epidemic influenza type were prevalent throughout the whole colony during the year, fifty-nine deaths being recorded from 1,533 cases.

Malarial fever, reported last year to be prevalent in the valleys around Kingstown, has maintained its existence in spite of regular fortnightly visits of the sanitary inspectors. The return of infected labourers from South American countries, together with sufficient numbers of anopheline carriers, are the principal factors present, and account for the continued existence and future probable spread of the disease.

Just at the close of the year one case of enteric fever was recorded in the better class residential

area of the town; subsequently four other persons in the same house becoming infected. As soon as it became possible to remove the sick the house was fumigated, disinfected and cleansed. No further spread of the disease from this focus was recorded, and the infection which occurred appears to have been purely local.

The supply of milk for the use of public institutions has continued to be obtained from the Camden Park Dairy erected at the beginning of the year. The efforts, however, of the proprietors to take sufficient interest in its sanitation have not been successfully maintained, and constant supervision has been found necessary. The idea, however, has produced good results, as during the past year a similar dairy has sprung into existence, and there is a reasonable possibility of a third being erected.

The 1915 Regulations providing for the registration of both cow keepers and milk sellers and generally controlling the sale of milk have worked satisfactorily.

The bakeries and soda-water factories were frequently inspected during the year, and prosecutions were entered where breaches of the Regulations governing them were discovered. The sanitary inspector notes some improvement, and refers to the fact that the former dislike to inspections on the part of the bakers is disappearing.

The sanitary condition of the colony has on the whole improved, but efforts are still required to maintain the ground gained. The sanitary inspectors' remarks on both Layou and Calliaqua are unsatisfactory, and should have the attention of the town wardens concerned. For the detailed report on the condition of the small towns and villages reference may be had to the sanitary inspector's report which is attached.

The meat on sale at the meat market in Kingstown was inspected daily by the Government veterinary surgeon.

The rat campaign has been regularly carried out during the year.

Four thousand three hundred and ninety-three rats caught were dissected and examined by the Rodent Examiner. No infected rats were found.

Report of the Government Sanitary Inspector.

By J. Ernest Robinson, A.R. San. I., Sanitary Inspector.

Kingstown.

The general supervision of the town mantains the same standard as last year.

Little has been done in the way of structural improvements to property, and the important question of having each house provided with a fly-proofed closet seems to have been left entirely alone. There is no doubt excuse for inaction in some cases. I refer to those in which the owners are poor, and experience increased hardship owing to the great struggle in which all Europe is engaged against a common foe.

I have reported upon the unsightly practice of emptying the night soil utensils on the foreshore, and the evil has since received attention at the hands of the police, so that now the practice is materially lessened.

Inspections of the soda-water factories and bakeries have been made regularly and prosecutions instituted when circumstances demanded such procedure. There is still much room, however, for improvement in the manner in which these places are kept, and I have no doubt but that marked improvements will be brought about in the near future, as the bakers are not opposed to these desirable measures as formerly. They listen and reason with me when discussing suggested measures and good is bound to result.

The practice of allowing pigs to feed on the bayside has been dealt with, and the nuisance has been abated.

I have reported on the practice of hawking fish around the town, this being contrary to the Kingstown Board Ordinance, 1897. I believe that the Kingstown Board agreed to publish bills warning people against the practice.

It has not been found possible to adopt some method of preventing ground moisture from entering the walls of new buildings in Paul's Lot. This is a highly important matter, and must have a detrimental bearing on the health of a dweller in such a house. In England no house is permitted to be erected anywhere without provision being made for the prevention of ground moisture entering its walls.

Five cases of enteric fever have occurred in one house in town. Four of the patients were removed to hospital and the house disinfected throughout with sulphur-dioxide and afterwards with formalin. An inspection of the house and its surroundings was made, and the close proximity (about 8 ft.) of the ventilating shaft from a patent closet to the bedroom window reported. Since then this defect has been remedied.

In a special report with sketch I have shown the advisability of using damp-proofed courses in the erection of dwellings.

The Milk Supply.

The Government institutions are still receiving their supply of milk from the Camden Park Dairy.

Only two prosecutions of milk sellers have been instituted, and these successfully.

The Leeward District.

Chateaubelair.—The work of scavenging the town has been fairly well performed, and every credit is due to those in whose hands the immediate supervision lies. I have drawn attention to the practice of storing vegetable refuse and manure at the high end of the town for use on the estate near by.

Nothing has been done to deal with the severe trimming of trees which would benefit the town, but efforts have been regularly made to have

localized trimming done, and much good has resulted.

What has been lacking during the year is progress in the erection of good simple type closets, and this is one of the main issues to be considered in a sanitary campaign in this town.

Several people have been asked to remove donkeys kept under their dwellings over nights, and I do not know of any persons now so stabling their animals.

There are no swamps in the town, and stagnant water was rarely found.

A good concrete house intended for the use of tourists is in course of erection, and adds much to the attractiveness of the town.

Rose Bank.—This cannot be considered a village in the recognized sense of the word, but simply a collection of huts interspersed with fruiting trees of different kinds. The people have a good piped supply of water from a storage tank on the hillside about a quarter of a mile away. The chief cause for complaint is that the people will continue growing sugar-canes or some other high plant in close proximity to the huts themselves. Owing to the rapidity with which weeds grow the village has often appeared unsightly, but this is due in no way to inaction on the part of the police sanitary officers. I have warned the people against the practice of keeping animals in close proximity to their dwellings, and notices have been served for this purpose. Here again sanitary conveniences are practically non-existent.

Troumaca.—The water supply of Troumaca is obtained from two sources, viz., the supply at Rose Bank, which fails to reach the pipe on the roadway to the former in the dry season, and from the roofs of the buildings. Several people use large cauldrons for the storage of water, but it is only in very few instances that I have found mosquito larvæ therein. This is owing to the rapid consumption of whatever water is stored.

The village itself suffers from want of attention to the middle path, i.e., that separating the school from the schoolhouse. This pathway is often more like a garden let run wild than anything else.

The different lots of land themselves are indifferently kept in many cases, and people have been warned and notices served in connection with the keeping of animals under unsuitable conditions. There are three bakeries at Troumaca, and these have been kept in clean condition during the year.

Rose Hall and Monsieur Louis have been visited and call for little attention, owing to their wind-swept position. They are clean and healthy places, and the latter difficult to reach except via Rose Hall.

Coull's Hill.—This scattered village has a great number of trees which still need to be trimmed. Standing practically on the summit of a hill, it is entirely without a water supply other than from the river nearly a mile away, and it is owing to the terrible climb which must be made that so many of the people keep water containers of various kinds about their premises rather than carry a regular supply to their dwellings. Some of the storage places are broken cauldrons, and they are extremely difficult to make mosquito proof, hence many people have been warned and notices served in connection therewith. Manure having been deposited in some quantity near to the roadway and in the vicinity of some of the houses, I recommended that it be moved.

The Wesleyan School at Westwood is without a suitable closet, and will be dealt with now that the school at Chateaubelair has been supplied.

Barrouallie.—The town of Barrouallie was stated in my last year's report to contain too many trees, and, despite my remarks in my monthly reports this year, nothing much has been done to improve upon the then existing condition.

Mosquito larvæ have been discovered in different barrels and fishing boats, and the nuisances abated. The closeness of a horse-stable to a bakery has been reported upon and the fault abated. Seven people have been reported for tethering donkeys overnight under their houses, and they have been instructed to abate the nuisances caused thereby.

The town still has an excessive number of trees, some of which could be trimmed without any loss to their owners and with possible improvement to those permitted to remain (e.g., those on the seashore).

Many of the houses are without sanitary conveniences at all, and others are provided with structures which do not meet with the Ankylostomiasis Regulations.

Wallilabo.—This little village has never appeared to be much better off for the inspections bestowed upon it. Regular inspection and determination to see that the instructions given are carried out are necessary. The chief fault found is the growth of weeds. There are no sanitary conveniences here.

Cumberland Bay.—At Cumberland Bay the question of pig-keeping in close proximity to the huts has been dealt with, and instructions given as to how to prevent nuisances arising therefrom. One unlicensed milk seller was fined and a licence taken out.

On the opposite side of the Bay, leading in the direction of L'Ance Mahaut, the land was found to be unduly swampy owing to the want of drainage, but nothing appears to have been done to relieve this.

Spring Village.—This village is in a bad position from a sanitary standpoint, but must no doubt remain where it is. If a drain 2 ft. by 18 in. were to be constructed, as has been suggested, on the high side of the road, much of the water now sweeping over the lower part of the village would be collected and carried off, and this part of the village itself would be much drier in consequence. There are practically no sanitary conveniences, and hence people make use of the swamp and river bed for the deposit of fæcal matter. A public latrine has been suggested, which seems to be the best way of dealing with this question.

Lance Mahaut.—There are only a few huts here, but I found that the place needed trimming and the pigs moved from the huts.

The well was inspected, and the people declare the water from it to be good.

Layou.—It is a matter for regret that the still existent evil due to the offensively smelling gutters near to the public water taps at Layou has not been abated. People are alleged to wash all kinds of utensils at these public taps, and the earth gutters at these respective points become sodden in consequence. Until this work is done constant attention should be given to them. The town in general has only been moderately well looked after.

The whole of the bakeries, six in number, have been inspected.

Buccament Bay.—This village has been but poorly supervised, and it was left to me to trace three unlicensed bakeries there. The village needs careful inspection, and that at regular and frequent intervals. It has too many trees in it, and the number of sanitary conveniences there are, as in other districts, few.

Vermont and Malony.—These places have been visited. Some of the houses are neat, clean, and well-kept.

Rillands.—I suggested that the source of water supply, which is so limited as to be almost dry in the dry season, should be protected by boarding up the collecting chamber at a small cost.

Chauncey and Questelles.—This area has been inspected and instructions given where necessary to trim trees and remove decayed vegetable refuse.

Clare Valley.—People here have been instructed to trim their trees and to remove manure in too close a proximity to their houses.

Lowmans and Camden Park.—These places have been inspected on several occasions during the year. Instructions for the removal of manure, stagnant water, and the trimming of trees have been given and obeyed.

Edinboro.—This village has been visited frequently and material improvements have been effected in the lower portions of the same, and the necessity for weeding the gutters on the road sides has been reported.

Montrose and New Town.—The keeping of stagnant water, cleansing of lots, and the insanitary manner in which animals are kept here, have been dealt with. On May 22, 1915, I met a man in the act of slaughtering a goat in Montrose, and being suspicious that the carcase would eventually find its way into Kingstown, I had the man watched. Later in the day my suspicions were confirmed. He was charged with offering meat for sale in Kingstown, such meat not having been killed in the abattoir, and convicted.

Richmond Hill and Frenchcs.—This area has been inspected, and much good work has been done by the police in cleaning up what is still an overcrowded area. The question of providing good closets has still to be dealt with.

Sion Hill.—Frequent inspections of this area have been made and notices served requiring the construction of closets and the abatement of nuisances.

Windward District.

Calliaqua.—This town seems to have been badly looked after during the past year, and the scavenging has been the subject of complaint on several occasions; in fact, I have only once reported it as satisfactory. It is perhaps advisable to explain that this work deals only with the cleansing of the streets and the collecting of vegetable refuse, bush, &c., which is thrown out by the inhabitants. I have known these deposits to lie in the streets for days, and have called attention to the same by report. The general police inspection of this town has not resulted in the amount of good that could be desired, but the quantity and value of the trees have much to do with this. Some wells have been filled in, but that near to the police station still remains only partially closed. The well on the old market square has been filled in. Nothing has been done as yet to lessen the turbidity of the water caused by heavy rains. The increased flow of water into the source of supply during the wet season stirs up the clayey stratum, and the discoloration shows itself in the water drawn from the taps in the town. If proper filters were erected, then not only would the water maintain its clearness, but a saving of expense for opening up or cleaning the pipes themselves would result.

Each house has had constructed on the premises surrounding it a suitable simple type fly-proofed closet.

The type is that approved of by the Ankylostomiasis Regulations, and would last a long while with careful handling. Some of the houses are now without the original closet, and a new one has not been procured. Other people are careless regarding the regular emptying of the contents thereof.

The four bakeries in the town have been satisfactorily conducted.

Choppins.—This village has been inspected, and much work still remains to be done there. One prosecution of a milk seller for failing to comply with the Dairy Regulations has been instituted successfully.

Colonarie.—The village near to the police station at Colonarie has received very meagre attention. Pigs have been kept in close proximity to the houses, manure has been allowed to accumulate, and the village itself got into a neglected and insanitary condition. It is in a much better condition now, but far from what it should be. The roadside gutters have been constantly neglected. Notices have been served here to abate the usual type of nuisances already mentioned as existing on the Leeward Coast.

South Rivers and Three Rivers.—The dwelling houses in these places have been constantly visited. Trimming of trees has also been engaged in in a small way, and much remains to be done if daylight and sunshine are to be admitted to the houses.

Colonial Medical Reports. No. 81.—Saint Vincent (*continued*).

The question of providing sanitary conveniences to the South Rivers Wesleyan School has been dealt with, but I have deferred action pending the completion of the same work at the Wesleyan School at Dickson Village near to Georgetown.

Park Hill.—Further trimming of trees and the erection of latrines are still necessary. Similar work has been engaged in during the past year.

Mount Grennan.—I have given personal instructions for the removal of conditions which will cause undue dampness to the houses here.

Diamond Village.—This village is still enveloped in an overgrowth of trees and sadly lacks latrine accommodation. Inspections have been made with a view to discovering the persons polluting the river there, but without success. People here have been instructed to throw away stagnant water and to erect closets.

Georgetown.—Georgetown continues to make structural improvements, and alterations have been made in the slaughter-house and a blood tank—a very objectionable thing to build—erected there. Trimming of trees has begun, and the town has been inspected on several occasions. It possesses an excess of trees. The bakeries, five in number, and the soda-water factory were inspected and found to be well kept. The new public convenience has been unnecessarily fouled by the people using it, and a reward has been offered for information leading to the detection of the offenders.

Owia, Fancy and Sandy Bay.—Suspected cases of yaws have been discovered in these places and reported.

Overland.—I have drawn the people's attention to the presence of some of the coppers, and the water has been thrown away.

Caratal.—Not only is the village overcrowded, but the public pathways through it have not been kept in the best order. I have served notices and requested the removal of animals kept under improper conditions. Trimming of trees and clearing of bush-covered land has been carried out with good results. The police have certainly neglected to thoroughly inspect this village, otherwise the conditions found could never have existed.

Chili.—This village suffers from want of sunlight still, and it is very difficult indeed to make rapid headway in clearing up the place. Stagnant water has been found, likewise badly constructed privies, and instructions have been given to remedy these faults. The one bakery situated here is in bad order.

Dickson Village.—This village is typical of many more that exist. Here are huts, and immediately joining them are cocoa and other fruiting trees. Some trees have been removed from some private land by the owner on his own initiative, and trimming and cleaning have been carried out elsewhere, but much remains to be done.

The want of school repairs, the provision of latrine accommodation, and the removal of the soil abutting on the rear wall itself have not been undertaken as yet. As there are a great many ulcered people living in this and the surrounding area, warnings have been given with a view to stopping the objectionable practice of washing ulcered wounds and depositing fæcal matter in the river here. This is very necessary, as the water in its lower reaches is used for domestic purposes.

Grand Sable.—This village has been inspected, and the people instructed to remove pigs from near to their dwellings.

Byera.—Pig-keeping near to houses and the removal of collections of manure have been dealt with.

Mesopotamia Valley, Richmond Park, and Hopewell.—Trimming of trees and the removal of refuse liable to create a nuisance have been carried out, but the work has been hampered by the value of the trees found. Had it not been so greater clearances would in many cases have been effected. Excessive dampness prevails in this valley owing to its position. The lower end of Mesopotamia leading in the direction of Escape still needs attention.

The butcher's stall used on Saturdays is in an insanitary condition. A concrete slab is being erected in its stead. Attention has been called to the want of improvements to the Marriaqua schools and the same complied with. The different bakeries have been visited and found to be in good order.

Eresham Vale.—Two unregistered bakeries have been discovered here. One of these failed to comply with the Bakery Regulations and was put in order. The village itself has too many trees in close proximity to the houses.

Grants' Village.—There are too many trees here, and the Corporal of Police has been asked to pay special attention to the same. The limbs of trees were found to overhang the railways and cause unnecessary dampness.

Victoria Village and Stubbs.—Both villages have been inspected. Two unlicensed bakeries have been discovered and one of them placed on the register. Orders have been given to trim, and notices served for the abatement of various nuisances.

REPORT ON THE COLONIAL HOSPITAL.

By CYRIL H. DURRANT, M.B., Medical Officer, Kingstown District.

COLONIAL HOSPITAL,
ST. VINCENT.

Within the past year it has not been found necessary to undertake any extensive improvements to the buildings. Both rooms and lavatories have been erected adjacent to the male wards, and a laundry has been established in the grounds. These minor improvements have resulted in greater efficiency of administration.

There were 839 cases admitted to the wards of the General Hospital, making, with fifty-one

remaining over from 1914-15, a total of 890 cases treated.

In addition eleven cases were admitted to the Graham Wing—ten as private paying patients and one nominated for free treatment. Of these eleven cases, one—a case of meningitis—died.

The total number of cases, therefore, treated at the hospital for the year under review was 901, sixty-nine less than in the previous year.

Of the cases admitted to the wards of the General Hospital, syphilis, in one or other of its phases, accounted for 128 admissions with two deaths; ulcers (other than those of syphilitic or frambœsial origin) for eighty-five admissions, and intestinal parasites (ascaris and ankylostoma) for forty-four admissions. There were ninety-three admissions for malaria with four deaths, as against fifty-eight admissions with a similar number of deaths in the previous year. Pulmonary tuberculosis provided twenty-two admissions with one death, as against twenty-three admissions in the previous year.

There were forty-eight deaths, giving a death-rate of 5·32 per cent. of the total number of cases treated. The daily average number of inmates was fifty-seven.

The number of cases admitted to the Maternity Department during the year was ninety-five, of which two died, one from eclampsia, the other from pulmonary embolism.

There were twelve stillbirths.

There were 4,979 attendances at the Out-patient Department, which is also the dispensary for the Kingstown District.

Of these fifty-seven died, giving a death-rate of 11·4 per thousand.

Of the cases applying for treatment, "catarrhal fevers" head the list with 444 cases with three deaths. Syphilis accounts for 157 cases with eight deaths from the later ravages of the disease. Malaria accounts for 158 cases with one death, as against 179 cases in last year's return.

The "diarrhœal diseases" of children provide ninety-six cases with thirteen deaths, equal to a mortality of 13·5 per cent. of the cases treated. Ankylostomiasis shows forty-one cases, and pulmonary tuberculosis fifty-one cases with five deaths, as against thirty-five cases with ten deaths in the previous year.

Of zymotic diseases, one case of mumps and twenty-nine cases of whooping-cough were recorded.

Report on Charitable Institutions at Fort Charlotte.

Kingstown,
St. Vincent.

It has not been found necessary, nor have funds been available to carry out any extensive improvements or repairs during the year.

The chief difficulty in the management of the pauper asylum is to keep numbers down to the estimate of 100 inmates, for which number the estimates are made.

The general state of health maintained by the inmates has on the whole been satisfactory.

The daily average number of inmates in the leper asylum for the year was eight.

It should be remembered, however, that there is no compulsory segregation of the disease in force, and only cases that are destitute or are found soliciting alms are taken in and cared for in the institution.

During the year under review no cases have been sent to the Grenada Lunatic Asylum, while, on the other hand, there has been an increase in the number of admissions. Seven of these were cases of uncertified lunatics housed in the Pauper Asylum who for purposes of detention had to be certified, while in addition ten new cases were admitted, bringing the total number of lunatics confined in the institution to thirty-nine.

The number of cases treated at the Yaws Hospital during the year was 214, as compared with 283 in the previous year.

The bed capacity was, however, reduced on April 1, 1915, from fifty to thirty beds, and was increased to fifty again on August 1, owing to the reported increase in the prevalence of the disease in the out-districts.

The difficulty of obtaining regular supplies of kharsivan, which has superseded the Teutonic "606," has interfered in no small way with the routine treatment of cases.

Colonial Medical Reports.—No. 82.—Egypt.

ANNUAL STATISTICAL REPORT OF PUBLIC HEALTH FOR 1915.

By D. SEMPLE,

Director-General.

Introductory Note.

This report is a short résumé of the work carried out by the Department during the year 1915.

During the year the Statistical Section was reorganized and placed on a better footing. Part of the work was transferred to the Statistical Department, Ministry of Finance, and the remainder given to the Sections of the Department most concerned.

The Serum Institute, for the preparation of cattle plague serum, was closed for the time being, or until the stock of serum on hand is used up, and the equipment was stored for future use.

A good deal of extra work was thrown on the Hospitals Section, owing to the large number of sick and wounded military patients treated in the Department's General and Ophthalmic Hospitals. The total number of these patients during the year 1915 amounted to 14,851 in the former and 5,522 in the latter.

Owing to the war conditions in Egypt, the Hygienic Institute (in addition to its general work) had to undertake the work of a Central Bacteriological and Chemical Laboratory for examinations and investigations connected with the health of the troops. This necessitated the formation of a Diagnosis Section and an increase of the Institute staff, and it also meant that the services of the English bacteriological and chemical staff (who had volunteered for war service at the beginning of the War) were placed at the disposal of and utilized by the military authorities.

A travelling bacteriological railway car, fitted up as a bacteriological laboratory and put into working order, together with an attendant from the Public Health Laboratories, was put at the disposal of the military authorities in the Suez Canal zone, with headquarters at Ismailia. This put into the hands of the military a fully equipped travelling laboratory for the investigation and diagnosis of diseases in the Canal zone.

At the beginning of the War the services of many permanent officials and employees of the Department were requisitioned by the military authorities for service with the Armies of the Allies.

In addition, the services of every official in the Department were freely given for military work when required, with the result that in various capacities the Department was enabled to carry out a large amount of very useful work for the troops in Egypt and those returning from the Mediterranean base.

D. SEMPLE,
Director-General.

THE FOLLOWING EXTRACTS ARE TAKEN FROM THE ANNUAL STATISTICAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH FOR 1915.

Ministry of the Interior, Egypt.

Cemeteries and Private Tombs.

(*a*) *Cemeteries.*

The special credit of £E1,000, which has, of late years, been annually granted by the Ministry of Finance for inclusion in the budget of this Department, has now been transferred to that of the Survey Department, which will, in future, carry out all engineering work in connection with cemeteries which was formerly done by the engineers of this Department who were paid on the special credit. This work includes the preparations of plans, demarcation of boundaries, erection of boundary pillars, inquiries regarding encroachments, preparation of documents for decrees, &c.

(*b*) *Private Tombs.*

Article 9 of the Regulations dated September 15, 1876, and March 26 and October 30, 1877, gives to the *Directeur des Services Sanitaires* the power to grant special authorizations for burial in private mausolea not situated within cemeteries. Frequently these mausolea are to be found within mosques, at other times in gardens. The privilege of being allowed to bury in private mausolea is one which is much coveted by the inhabitants of the country, and authorizations are granted only after careful inquiry.

In 1911 considerable discussion arose in connection with the application of a well-known person, and in consequence the issue of all authorizations was suspended. Towards the end of 1914 an agreement was arrived at with the Ministry of the Interior as to the principles which should guide the Department in issuing these special authorizations, and since the beginning of 1915 their issue has been recommenced.

Apart from the essential condition that no harm shall result to public health from the position of the mausoleum, the principle underlying the granting of this privilege is that the applicant must be a man of some note, of high character, and must have performed some work of benefit to the community.

Slaughter-houses and Slaughtering Sites.

No new slaughter-houses were established in the country during 1915.

Hitherto the method adopted for appointing a slaughtering site in a village not possessing a slaughter-house has been the following:—

When the site selected has been approved by this Department, the Mudiria prepares an *arrêté*, which, after having been approved by the Ministry of the Interior, is notified to the inhabitants of the villages concerned by being posted on the door of the *omda's* house. A copy of this *arrêté* is then sent to the Parquet in whose circumscription the village exists, for reference in case of legal proceedings.

As this Department is the authority charged with the appointment of these sites, the following procedure will be adopted in future, the Ministry of the Interior and the *Contentieux* having respectively agreed as to its desirability and legality.

When the usual preliminaries have been completed for the selection of a slaughtering site for a village where no public *abattoir* exists, and when the site has been approved by this Department, the latter will itself issue the official notice appointing the site.

The Department will cause this notice to be published in the *Journal Officiel*.

The Mudiria will, at the request of the Department, make two copies of the notice in the *Journal Officiel* and will cause one to be posted on the door of the *omda's* house, and the other to be fixed to some convenient structure as near as possible to the site selected.

Whenever a contravention is made out against any person for slaughtering on a site other than that appointed, reference will be made in the *procès-verbal* of contravention to the number and date of the *Journal Officiel* in which the official notice appeared.

Vital Statistics.

On the occasion of the departure of the late Director of the Statistical Section of the Department, the opportunity was taken of abolishing the post and transferring the greater part of the statistical work to the Statistical Department, Ministry of Finance, to which it more properly belongs.

The statistical work retained as being inseparable from the Department is as follows:—

The administration of the Births and Deaths Decree, the Department being responsible under this Decree for carrying it out; the administration of the Vaccination Law, the statistics of all the infectious diseases in the country, and the statistics of all Government hospitals managed by the Department.

The work connected with the application of the Births and Deaths Decree was attached to Section I along with the remainder of the staff of the Departmental Statistics Office not transferred to the Statistical Department, the work relating to the statistics of infectious diseases and general hospitals remaining with the respective Sections concerned with these two branches of departmental work.

From July 17, 1915, the Statistical Department undertook the collection and publication of the weekly, quarterly, and annual public health statistics, which had been carried out up till then by the Department of Public Health.

The returns of births, deaths, and vaccinations throughout the country are forwarded from Governorates and chief towns of Mudirias and Markazes direct to the Statistical Department by the respective Public Health offices; for the twenty principal towns they are supplied weekly.

For villages these returns are sent in monthly by the *Sarrafs* to the Mudirias and Governorates (*Qalam al Idara*), whence they are dispatched to the Statistical Department.

The returns of infectious diseases and of general hospitals are forwarded to the Statistical Department by the Sections concerned.

General Hospitals.

Hospitalization of Military Patients.—During the year 1915 the European War began to have its effect upon the Government general hospitals.

Early in January the hospitals at Alexandria, Port Said, and Suez began to admit military cases into the second class.

In February Qasr el 'Aini Hospital was cleared of Egyptian patients and used as a base hospital for wounded Turkish prisoners. Arrangements were made for the accommodation of the Egyptian patients in the Church Missionary Society's Hospital at Old Cairo, the Waqf Hospitals, and the German Hospital.

In April accommodation for 2,000 military cases was arranged, and this was increased later in the year to over 2,300.

In considering these figures it is interesting to note that the total bed accommodation of all the Government general hospitals was in 1914 only 2,485 beds for the whole of Upper and Lower Egypt.

It was further arranged that the Army authorities should pay P.T. 40 per diem for officers and P.T. 17·5 per diem for non-commissioned officers and men. Matrons and nursing sisters were sent to all the hospitals which were not already so staffed. The hospitals filled up immediately the beds were ready, and on May 12 the General Officer Commanding the troops in Egypt, together with the Director Medical Service, inspected all the Delta provincial hospitals, and expressed himself pleased with the accommodation and treatment provided. In December the Government hospital at Medinet el Fayûm was opened for the reception of military cases.

In every instance where a Government general hospital was used for military cases, arrangements were made for the accommodation of the Egyptian patients.

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This in many places was done by converting the infectious hospitals into general hospitals for Egyptians and putting the infectious cases into tents or matting huts. In other cases the out-patient buildings were turned into wards for the Egyptian patients, and temporary structures erected to accommodate the out-patients.

In all 14,851 military cases, including prisoners, were treated in the Government general hospitals during 1915.

The number of patient-days for military cases was 306,540.

Out of the 14,851 military cases admitted, 4,459 were discharged as fit for immediate duty, 7,769 were discharged to convalescent homes or camps, 1,262 were invalided to England, 816 were transferred to other hospitals, and 212 died.

The average death-rate for military cases during 1915 was 1·427 per cent.

General Statistics.

Owing to the altered conditions due to the admission of military cases, any comparisons between the statistical figures for 1915 and those for previous years lose considerably in value.

The number of hospitals remained the same as in 1914, i.e., twenty-two.

The number of beds, however, increased from 2,485 in 1914 to 3,320 in 1915, an increase of 835.

This increase was due to the expansion of the hospitals in order to accommodate the military cases. The number of in-patients admitted in 1915 was 50,483, as compared with 44,914 in 1914, an increase of 5,569.

The number of voluntary in-patients in 1915 was 14,807, as compared with 20,293 in 1914, a decrease of 5,486. Military cases were not, of ccurse, classed as voluntary patients. This decrease was chiefly due to the fact that for the greater part of the year Qasr el 'Aini Hospital was admitting military cases, and, therefore, the majority of the voluntary native patients of Cairo went to other hospitals.

The average death-rate for all in-patients (both military and civilian) during 1915 was 5·076 per cent., as compared with 6·225 per cent. in 1914.

The number of new out-patients during 1915 was 152,329, as compared with 179,338 in 1914, a decrease of 27,009. The number of out-patient attendances during 1915 was 340,774, as compared with 346,673 in 1914, a decrease of 5,899. This decrease in the number of new out-patients and in the number of out-patient attendances is due to the scale of fees for out-patient attendances which was instituted during 1914. These fees are 40, 20, 10, and 5 milliemes per visit, according to the financial position of the patient. The poor are treated gratuitously. As was pointed out in the report for 1914, these fees were instituted to stop "hospital abuse," i.e., persons coming to out-patient departments who could afford to call in a doctor: and also to reduce the numbers of out-patients, as the work of the out-patients departments was becoming greater than could be performed by the existing staffs.

Both these results may now be said to have been attained.

Cost of Maintenance.

The cost of upkeep of the hospitals during 1915 was L.E. 114,843·117 milliemes. This figure, as in former years, does not include the expenses of the Central Administration, nor does it include repairs and renewals of buildings.

The average cost per bed per annum was L.E. 34·591 milliemes, and the average cost per patient-day was 134 milliemes. During 1914 the cost of upkeep was L.E. 92,189·050 milliemes, the average cost per bed per annum was L.E. 37·098 milliemes, and the average cost per patient-day was 135 milliemes.

The increased expenditure during 1915 amounted to L.E. 22,654·067 milliemes. This was due to two causes: (*a*) The cost of equipping 835 extra beds and of converting hospitals equipped for natives into hospitals for Europeans; and (*b*) the increased cost of all equipment, drugs, dressings, food, &c., owing to the War.

It is extremely satisfactory to note that in spite of this increased cost the average cost per bed per annum decreased from L.E. 37·098 milliemes in 1914 to L.E. 34·591 milliemes in 1915, and the cost per patient-day decreased from 135 milliemes in 1914 to 134 milliemes in 1915.

In 1914 the total cost of upkeep of the hospitals was L.E. 92,189·050 milliemes and the total receipts L.E. 7,230·291 milliemes, therefore the actual cost to the Government of these institutions was L.E. 84,958·759 milliemes.

In 1915 the total cost of upkeep was L.E. 114,843·117 milliemes and the total receipts L.E. 53,786·241 milliemes; therefore the actual cost to the Government was L.E. 61,056·876 milliemes.

Hence in 1915 there was a clear economy to the Government of L.E. 23,901·883 milliemes as compared with 1914.

Of course, the large increase in the receipts of the hospitals was due to the fees received for the military patients.

General Notes.

During 1915 X-ray installations were installed at the following hospitals: Beni Suef, Mansûra, and Qaliûb.

There are now X-ray installations in ten of the Government General Hospitals, i.e., Qasr el 'Aini, Alexandria, Port Said, Suez, Tanta, Mansûra, Zagazig, Qaliûb, Assiût, and Beni Suef.

It is hoped to add to these installations year by year until all the general hospitals are so equipped. During 1915 a milk sterilization plant was erected at Alexandria Hospital, and another was ordered for Suez Hospital.

During 1915 hospital stewards were appointed to four hospitals. It is hoped year by year to appoint

more of these officials until there is one in every hospital.

They will relieve the medical officers of a considerable amount of routine work, and allow them to devote more time to the actual treatment of the patients.

New Buildings and Repairs.

The following new buildings were commenced or completed during 1915:—

The Nurses' Home at Alexandria Hospital was completed and occupied.

Two new blocks were commenced at the Abbassia Infectious Diseases Hospital. These are the first steps in a general scheme to enlarge this hospital. It is at present far too small to meet the requirements of a large city such as Cairo.

A new laboratory was commenced at Suez Hospital. This laboratory was very urgently required, chiefly for the pilgrim work.

During 1915 credits were obtained from the Ministry of Finance for the work of connecting Qasr el 'Aini and Port Said Hospitals to the main drainage systems of Cairo and Port Said. This work, when finished, will result in a real economy, as a considerable sum was spent annually for pumping out the cesspits of both these hospitals.

Government Dispensaries.

The number of Government dispensaries managed by the Department of Public Health during 1915 was forty-four, as compared with forty-three in 1914.

A new dispensary was opened at Tel-el-Kebîr.

The number of patients treated free of charge in these dispensaries was 41,258, as compared with 44,018 in 1914, a decrease of 2,760.

This decrease is explained by the fact that no figures are available for the dispensary at Siwa Oasis.

Schools for "Dayas."

There are six training schools for *dayas* (native midwives) in the provinces, viz., at Sohâg, Minia, Shibîn el Kôm, Tanta, Mansûra, and Zagazig.[1]

The Cairo school, which was closed at the beginning of the War, has not been reopened.

The course of training is for four months, during which time the pupils live in the school and have daily lectures from the matron. These lectures are supplemented by a course by the Government hospital doctor (except at Mansûra and Shibîn el Kôm).

The pupils (six, ten, or twelve, according to the accommodation) attend cases under the supervision of the matron and are well trained in cleanliness, the taking of normal cases, and treatment during the puerperium.

On passing an examination the *dayas* receive a certificate from the Department of Public Health.

An experienced pupil who has taken her certificate is now attached to each school as Staff *Daya*, and is of great assistance to the matron in the routine work.

The number of cases attended during the year has been 1,760; of these 137 were abnormal. Maternal mortality, eight; total visits of matrons and *dayas*, 22,928.

It is interesting to note that whereas Eastern women are supposed to have easy and uncomplicated labours, the experience of the matrons is that the cases are just as difficult as in England.

A large number of abnormalities occur, but the patients frequently recover rapidly from an alarming or apparently hopeless condition.

Labours are tedious, usually from uterine inertia, which seems to be due to the frequency of pregnancies commencing from an early age in girls who have not yet attained full growth or maturity.

Numbers of patients who have once been attended by the school *dayas* now send voluntarily for them on a second occasion, and most of the town *dayas* who have been trained at the school send for the matron when they have a difficult case.

A considerable number of women suffering from pelvic trouble come to the matron for advice. These are always seen, and if presenting serious symptoms are urged to attend at the hospital. Most of these cases are suffering from the result of bad midwifery, and many from the use of the "obstetric chair" during delivery.

There is urgent need for some form of supervision and inspection of the *dayas* after they receive their certificates.

It is too much to expect that the girls (after only a short four months' course and no previous education of any kind) should keep up to the level of their training when they return to their homes and again come under the influence of the old *dayas* and the superstitions and customs of centuries.

In many cases a "repetition course" at the school would be of great benefit.

Each *daya* on receiving her certificate leaves with a box fitted with all the equipment necessary for attending a normal case.

Over 100 of the women trained at Cairo and in the provinces have been visited during the year. The larger number were found to have reverted to the village ways and kept their boxes carefully packed away as mementoes of their training or had scattered their contents.

Some were doing quite fair work, considering the class from which they are drawn and their surroundings.

A few were most encouraging, and we hear good reports of their work from doctors whom they have called in for difficult cases.

The greatest need at present to cope successfully with the whole midwifery question is the establishment of a Maternity Hospital and Training School in Cairo. It should have a few beds and an extern department, and be staffed by women. Here

[1] During May and June the schools were closed, the Provincial Councils during that time kindly lending the services of the matrons for military work in Alexandria.

educated girls could qualify as *Qâbila* (midwife), either as a separate course or as a supplement to that received at Qasr el 'Aini. By this means a sufficient number would gradually be trained to go and work in the provincial towns and large villages, and by degrees replace the existing class of *daya*, who is often of the lowest class, and combines the occupation of washer of the dead and wailer at funerals with that of midwife.

Here also selected *dayas* from the provinces who give promise of good work might receive a longer course of training.

At present the only provision for maternity cases in Cairo are a few beds in the Waqfs Hospital at Bab el Lûk, and a few at Qasr el 'Aini, which are attended by the medical students and the pupils training as *mumarridas* (nurses) and midwives.

Children's Dispensaries.

The dispensaries for children have done good work during the year.

Two new ones have been opened at Beba and Wasta in the Beni Suef Province, so there are now twelve working. Of these, Assiût, Minia, Fayûm, Giza, Shibîn el Kôm, Tanta, and Zagazig are maintained by the Province Councils. That of Beni Suef is maintained half by the Provincial Council and half by the Municipality, while at Mansûra and Port Said they are entirely municipal.

In May the Provincial Councils kindly lent the matrons to the military authorities for work in Alexandria, and the dispensaries were closed for about two months, but in July they all reopened.

The attendances keep large. In six of the dispensaries doctors visit regularly, and are of great assistance to the matrons.

Infantile diarrhœa is prevalent in early summer, but exists all the year round, as the Arab mothers' ignorance on all matters concerning the care of children, and especially infant feeding, is deplorable. Eyes are treated at eight of the dispensaries (five of these have doctors attending), and add largely to the number of total attendances. Skin cases, the result of dirt and neglect, are always numerous, and cases of profuse impetigo, the result of the village barbers' attempts at vaccination, are not unknown.

It is gratifying to note the improvement in cleanliness among the children attending the old-established dispensaries compared with those coming to the newly opened ones. The mothers are learning to bring their children during the first days of an illness, and do not wait till they are moribund as they did at first.

That the dispensaries are appreciated by the people is proved by the fact that the women will not infrequently travel thirty kilometres from their villages to seek advice.

The average number of attendances of each patient at the provincial dispensaries is not so great as at those in Cairo, being about five compared with an average of nine in Cairo. This is probably accounted for by the long distances, and also by the fact that the country women work in the fields and are not so free as those in the town.

The daily attendances vary, but average 1,020 a day, the total number of new cases seen during the year being 48,923, while the total attendances number 255,082.

Ophthalmic Section.

Number of Hospitals.—The number of hospitals at work during 1915 was sixteen; two of these were opened during the course of the year, Minia Hospital on February 9 and Santa Hospital on December 20.

Travelling Hospitals.—These hospitals worked only for four and a half months at ophthalmic relief; they were then transferred with their equipment and staff to help to form the large camp general hospital for British sick and wounded soldiers at first at Alexandria, and subsequently at Giza, near Cairo. The administration of this general hospital was entirely carried out by this Section.

Permanent Hospitals.—These hospitals worked throughout the year normally, though the beds of the Lower Egypt hospitals were occupied during six months by British sick and wounded.

School Inspection.—Owing to the junior doctors having to work at the hospital for sick and wounded (British soldiers), the ophthalmic treatment at the schools was curtailed, though the inspection was carried out to aequire the usual necessary statistics.

Ankylostomiasis Campaign.

The travelling hospitals have carried on work for the months of January, February, and March, 1915, while one permanent hospital provided for by Ibrahim Pasha Murâd continued work till the end of the year. Arrangements had been completed for the opening of another three travelling hospitals in Sharqîa Province, but with the kind consent of the International Health Board of the Rockefeller Foundation and the Department of Public Health the five travelling hospitals, including their equipment and staff, were employed at the Alexandria, Zagazig, and Giza camps for British and Senegalese sick and wounded.

The number of patients admitted to hospitals for treatment amounted to 4,902.

The number of microscopical examinations made for ova was 12,584.

A survey at Assiût, the most important province of Upper Egypt, has been carried out with a view to determine the incidence of ankylostomiasis, and shows that no less than 45 per cent. of the male population are so affected. A report on this survey campaign has been issued.

Infectious Diseases.

The chief features to be remarked in connection with infectious diseases during 1915 are:—

(1) The considerable increase in the case incidence and mortality from typhus and typhoid fevers.

(2) The marked increase in the case incidence from relapsing fever.

(3) The continued reduction in the incidence and mortality from measles.

Typhus Fever.—The following list shows the number of typhus cases and deaths reported during the last five years:—

	1911	1912	1913	1914	1915
Cases	5,012	5,380	4,936	9,508	17,096
Deaths	1,222	1,658	1,438	2,533	4,216

The greater part of typhus cases occurred in Lower Egypt. The Mudirias which suffered greatly from the disease were: Daqahlia, in which 4,103 cases were reported; Gharbia, 2,755; and Beheira, 2,644.

Typhoid.—During the year powers were obtained for the compulsory isolation of typhoid fever cases, when thought necessary, and the disease was accordingly transferred from the second to the first category of diseases mentioned in the schedule attached to Law No. 15 of 1912.

Relapsing Fever.—761 cases of relapsing fever occurred in 1915, against 211 in 1914. This increase is due to the importation of the disease in the persons of Egyptian labourers returning from Lemnos.

Measles.—The number of measles cases reported in 1915 has greatly decreased. Below is the number of cases of measles and deaths therefrom recorded during the last five years:—

	1911	1912	1913	1914	1915
Cases	8,382	4,678	6,125	5,158	4,394
Deaths	4,380	2,778	3,119	2,270	1 754

It will be noticed that the percentage of deaths to cases has also decreased.

Plague.

The total number of cases of plague which occurred in 1915 was 235. In 1914 the number was **219.**

The number of localities infected in 1915 was forty-two, against thirty-nine in 1914 and fifty-two in 1913.

Malaria.

The number of cases of this disease which have come under the notice of the Administration during the year is 488.

The total number of cases notified in the previous year was 920.

The Pilgrimage of 1915.

Owing to the present War and the suspension of land and sea communication between Egypt and Arabia, the Government, acting on the *fetwa* of the Grand Mufti of Egypt, issued a circular to all Mudirs and Governors asking them to warn the inhabitants against the risks and dangers to which the pilgrims to the Hejaz would be exposed.

This circular, which only offered advice to the people and did not prohibit the pilgrimage, stipulated that the following deposits should be paid by the persons desiring, in spite of the present circumstances, to go to the Hejaz:—

L.E. 75 by pilgrims travelling 1st class
,, 50 ,, ,, 2nd ,,
,, 40 ,, ,, 3rd ,,

These deposits were intended to defray the expenses which the Government might incur in case it should be compelled to bring the pilgrims back to Egypt.

No pilgrims embarked from Suez port.

In December, 1915, 187 poor pilgrims returned from the Hejaz to Suez via Suakin on board S.S. *Neguilah*. These had passed quarantine at Suakin, and were kept at Suez under sanitary control for a few days. They were then sent to their respective villages at Government expense.

It may be noted that, owing to the present European War, the number of passengers arriving at Egyptian ports has greatly decreased.

Hygienic Institute.

In common with most Sections of the Department the Hygienic Institute has been materially affected by the War. The total number of examinations made during the year was 19,591, as compared with 10,978 in 1914. Of these examinations, 7,111 were made for the military authorities, but, excluding the work done for the Army, the number of examinations amount to 12,480, an increase of 14 per cent. on the work of the previous year.

In addition to the ordinary work of the Institute, considerable changes have been effected in the course of the year, notably:—

(1) The establishment of a Diagnosis Section.

(2) The formation of a Water Section for the control of water supplies.

(3) The erection of stores for the institutes and the preparation of a complete inventory of equipment, apparatus, chemicals, &c.

(4) The arrangement and cataloguing of the library of the Hygienic Institute.

(5) The erection of animal accommodation at the Hygienic Institute.

(6) The rearrangement of the Antirabic Institute with provision of a waiting room and a room for the injection of patients.

During the year the institute suffered a serious loss in the death of M. Pappel, chief chemist to the Department.

The post of Professor of Parasitology at the School of Medicine, which had been held by an enemy subject, being vacant, the lectures on this subject was carried out by the Sub-Director of the Hygienic Institute.

Owing to the difficulty experienced by the Department in obtaining drugs in Europe and the urgency of the demand, one of the chemists of the institute was sent to England to purchase these in London, and was absent for about three months.

The influence of the War has made itself particularly felt in the difficulty in obtaining glass, bacteriological stains, and pure chemicals. Fortunately the institute was well provided in this respect at the beginning of the year, but the increased amount of work and the demands of the Army have largely depleted the reserves of these materials.

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At the beginning of the year the English bacteriological staff, through the Director-General, placed their services at the disposal of the military authorities, but it was decided that they were more usefully employed in the institute.

BACTERIOLOGICAL SECTION.

Owing to the large number of sick and wounded soldiers in the hospitals in Egypt, the work of this section during the year has been largely increased.

As well as the usual routine examinations made for Government hospitals and Government services throughout the country, some 1,400 examinations were carried out for private practitioners. This service—the Diagnosis Service—has been regularized during the year, and a scale of fees for the different examinations at the institute has been drawn out and published in the *Journal Officiel*. In order that the institute should not enter into competition with private individual laboratories, these fees have been considered as consultation fees and have been charged accordingly. All specimens, where the necessity for a bacteriological examination is of importance from a public health point of view, or where, on the recommendation of the medical officer of health, an examination is desired, are examined free as part of the routine work, so that only a few special examinations (twenty-one) were made during the year, fees for which amounting to L.E. 36 were collected.

Varying numbers of blood specimens from the lunatic asylum have been examined weekly for the Wassermann reaction. The result of the Wassermann reaction in connection with nervous and mental diseases is of such importance that the institute has undertaken at the Director's request to make weekly examinations of all patients admitted into the lunatic asylum. This may necessitate the carrying out of this reaction on two days of the week instead of one as at present.

During the month of March the Serum Institute was closed, and arrangements were made for the cold storage of virulent blood in order to keep the strain. Some of this blood was afterwards utilized for the purpose of double inoculation in cases where a doubt existed as to the purity of the infecting strain or in districts where no virulent blood was procurable.

The old Khedivial Railway Car, which had been fitted up as a bacteriological laboratory, was finally put into working order and handed over to the military authorities on May 4. This car, which, when taken over from the Railway Administration, was originally intended for special work, such as plague, cholera, &c., has been of inestimable value in enabling the military authorities at once to establish a fully equipped bacteriological laboratory in the Canal zone with headquarters at Ismailia, and having the additional advantage of being able to be moved from place to place along the line as required. An attendant detached from the institute staff is with the car; he was in constant touch with the Central Laboratory in Cairo, from which all media and instruments required were issued.

In connection with the routine diagnostic work detailed above, investigations have been carried out on points of interest cropping up in the course of the work. A paper read by one of the staff at a meeting of the Auzac Medical Society gives the result of some researches carried out on the subject of enterica among the troops.

Bacteriological examinations were also made for various Government services, and reports were submitted on filters, disinfectants, milk, &c.

Experiments were carried out on sewage effluents for a Commission studying the question of sewage disposal, and bacteriological and animal experiments were made in connection with the work on *fessikh*,* published as a separate departmental paper.†

Examinations were made for the Cairo City Health Inspectorate of samples of water and ice as well as of aerated waters made by local firms.

Anti-scorpion Serum.—During the year thirty-seven reports were received on the use of anti-scorpion serum. The results of all the reports received since this serum was first used in 1906 are as follows:—

Age	Total number of patients treated	Number of deaths	Percentage of deaths
From 0 to 5 years	149	25	16·78
,, 6 ,, 10 ,, ...	115	7	6·08
,, 11 ,, 15 ,, ...	71	2	2·81
,, 16 ,, 20 ,, ...	65	1	1·54
Over 20 years	259	—	—
Cases for which no age was given	16	—	—
Total	675	35	5·18

Military Work.—The presence of large bodies of troops in Egypt, with the creation of numerous hospitals in Cairo for the reception of the sick and wounded from the Gallipoli Peninsula, necessitated the provision of facilities for bacteriological diagnosis on a very considerable scale, and such bacteriological equipment as was available in the military stores was almost exhausted at once by the sudden demand. The Hygienic Institute supplied the Army with a large amount of glass, culture media, &c.; but it soon became evident that the stock of these materials in the institute would not stand the strain if distributed to various military laboratories, and as it was not possible to obtain further supplies in any reasonable time from Europe, it was decided that, at any rate until military laboratory equipment could be obtained from England, it would be more economical to centralize the work as far as possible. With this object the services of the Hygienic Institute were placed at the disposal of the military authorities by the Director-General, and early in September the institute was constituted the Central Bacteriological Laboratory for the Army work of the Cairo district. During the latter part of the year four medical officers of the R.A.M.C.

* Locally prepared salted fish.

† "Report on the Sale of Fish, and the Preparation of *Fissikh* in Egypt." Cairo, 1916.

were attached for short periods to the institute, but the work was in the main carried out by the ordinary staff.

Milk Analysis.—The daily analysis of milk on behalf of the Cairo Health Inspectorate has been continued during 1915.

In addition the following investigations were made:—

Establishment of Standards:—

Butter.—Forty-one analyses of genuine *gamoos* butter-fat were made at regular intervals during the year. Each sample examined was prepared from the mixed milk of five healthy animals, milked in the presence of a member of the staff.

Six samples of butter-fat prepared in the laboratory from genuine goat's milk were also examined.

Milk.—Forty-six analyses of genuine cow's milk from individual animals were made during the year, the animals being milked dry in the presence of a member of the staff. This work is being continued.

One hundred and four analyses of genuine goat's milk were also performed, the animals being milked as above.

Benzoic Acid in Milk.—Experiments made in the laboratory confirmed the observation made elsewhere that milk on souring shows the reaction commonly employed for the detection of benzoic acid.

A method was evolved by which the presence or absence of benzoic acid in sour milk could be definitely established.

Lettuce Oil.—The chemical examination of lettuce oil (Arabic *zeit khass*), an oil expressed from the seed of a variety of lettuce cultivated in Upper Egypt, was undertaken. As the chemical constants of this oil do not appear to have been published previously, it was considered of interest to carry out the examination here. Several samples were examined, both of the oil purchased locally and of the oil expressed from the seeds in this laboratory. The work is being continued.

Lemonade.—At the request of the Cairo Health Inspectorate a variety of lemonades, aerated waters, &c., sold in different parts of Egypt, were examined. Eighty-seven samples were obtained and tested for saccharine and aniline dyes. Of these, thirty-two contained saccharine and thirty-six aniline dyes.

A bacteriological examination was also performed.

Bread.—Loaves made from a mixture of wheat and maize flours were prepared, and attempts were made to distinguish by chemical and microscopical examinations between bread made in this way and bread made from wheat flour alone. Unfortunately all attempts were unsuccessful.

Water Service.

With a view to the hygienic control of water supplies in Egypt, a special Water Service was formed by the Department early in the year, and was placed in charge of the Director of the Hygienic Institute with the collaboration of the Chief Engineer of Municipalities and Local Commissions. It is intended that this service will undertake the regular inspection of all public water supplies, whether these are in the hands of the Government, municipalities, companies, or private individuals, and will concern itself with all questions relating to water supplies in Egypt.

In spite of the exceptional conditions created by the War and the small amount of time available for this work a good beginning has been made. All the larger supplies have been visited and are being reported on. Where necessary repeated visits have been made and suggestions for the improvement of the existing conditions or for necessary modifications drawn up. The formation of a large number of military camps throughout the country has necessitated the provision of local water supplies, either by the sinking of wells or otherwise, and the Water Service has been constantly consulted by the military authorities regarding these supplies and has made a considerable number of analyses of waters, both chemical and bacteriological, in this connection.

Samples of all consignments of aluminium sulphate or "alumino-ferric" to be employed for the clarification of water are examined at the institute, both for their content of available aluminium sulphate and for absence of arsenic; and a number of specimens of sand have been examined for their suitability for use in filters.

The sinking of a new well by the Cairo Water Company for the supply of Zeitun and Heliopolis afforded a good opportunity of testing the character of the water in the various strata passed through, and by arrangement with the Director-General of the company a series of ten samples of water were collected at regular intervals between the depths of twenty-six and seventy-six metres. Samples of the corresponding strata were examined by the Geological Survey.

It was originally intended to sink the well only to a depth of sixty metres, but as the successive analyses showed that the character of the water was improving it was decided to sink it a further sixteen metres, which had the additional advantage that it was possible to exclude some of the upper strata which yielded a less desirable water. The final results have entirely justified expectations.

In the course of an inquiry into the distribution of the Cairo supplies, the question was raised as to whether certain of the public drinking fountains might not possibly be supplied by unfiltered Nile water. In order to settle this point advantage was taken of the fact that the water from the deep wells at Rod el Farag contains an appreciable quantity of manganese which is absent from the Nile water. Water from the wells at Rod el Farag was therefore substituted for the usual filtered Nile water for some days in supplying the town, and samples taken from each of the public drinking fountains collected and tested chemically. It was found that in every case the water was well water, showing that the water supplied normally to all the public drinking fountains is filtered Nile water. In order to prevent any possibility of error the samples were all actually collected by chemists from the institute.

A regular weekly bacteriological examination of

the Rod el Farag, Giza, and Me'âdi supplies, and a daily bacteriological examination of the water from the Cairo supply as delivered in town has been carried out throughout the year.

Although the Water Service has been in existence so short a time, its influence on the efficiency of many of the supplies is already evident. It has generally been found that the engineers in charge of the various provincial installations welcome any suggestions for the improvement of the supply, and as a rule take a genuine pride in their works. Considering the great influence which a good and safe water supply naturally has on the health of the population, it is to be hoped that means will be found for the extension of this service, with a view not only to the control and improvement of existing supplies, but also to the study of the many problems connected with drinking water in Egypt.

Vaccine Institute.

Of late years the output of calf lymph has been steadily increasing, a specially large increase occurring in 1914.

During 1915 the number of doses issued was slightly less than in the preceding year, owing to the influence of the European War.

The adoption of cold storage for the calf lymph has greatly simplified the work of the institute, and it is now possible to keep a large supply to meet any emergency.

The lymph kept at 2° C. has been found to maintain its efficiency, and no difficulty has been experienced.

Antirabic Institute.

Six hundred and sixty-nine persons were treated.* Of these, 518 completed the course, 147 were treated for ten days only, as the animal which inflicted the injuries was found after observation to be non-rabid, and four patients voluntarily ceased to attend.

The statistics, therefore, refer to 518 cases, against 531 in the previous year.

The monthly incidence was as follows: January, 51; February, 41; March, 58; April, 44; May, 40; June, 26; July, 50; August, 44; September, 42; October, 42; November, 40; and December, 40.

It is worthy of note that since the establishment of the institute the number of cases treated has in previous years shown a marked maximum for the month of June, whereas this year's figures show a marked minimum in that month.

The 518 persons treated may be subdivided as follows: Egyptians, 458; foreigners resident in Egypt, 55; foreigners not resident in Egypt, 5.

The cases were due to dogs in 470 cases;† cats, 14; wolves, 15; jackals, 2; monkeys, 3; horses, 5; donkeys, 2; camels, 5; human beings, 2.

The position of the bites or scratches was as follows: On the head, 59 cases; on uncovered parts, 292; through clothing, 167.

It was not always possible to diagnose the disease in the animals to which the injuries were due for the following reasons:—

One hundred and ninety-eight animals escaped and could not be found.

Thirty were killed, but the bodies were buried or thrown away instead of being sent to the institute.

Ninety-two dead bodies of animals arrived in a state of putrefaction, and no investigation was possible.

No information could be obtained regarding several animals.

A positive diagnosis of rabies was established in the case of forty-seven animals (forty-three dogs, two donkeys, one horse, and one cat), these having bitten sixty persons. The diagnosis was established:—

For thirty-four animals (thirty-two persons), by rabbit inoculation or microscopical examination at the institute.

For six animals (ten persons) by the Veterinary Department.

For seven animals (eighteen persons) by the Veterinary Service, Alexandria Municipality.

In the case of seven animals, having bitten sixteen persons, there is a strong presumption of rabies, based on the death of one or more of the persons bitten, from supposed rabies.

In eighteen cases the diagnosis was considered doubtful.

In twenty-three cases it was regarded as negative, the inoculated animals giving no reaction.

Method of Treatment.

The injuries are divided into three categories:—

Bites on the head.

Bites on uncovered parts other than the head.

Bites through clothing.

For all bites of the first category, and sometimes those of the second, serotherapy is employed as well as vaccination.

Serotherapy.—The method employed is that of Dr. Marie (in use at the Pasteur Institute, Paris), slightly modified. Dr. Marie's original method is to emulsify 1 grm. of the medulla of the inoculated rabbit in 10 c.c. of saline solution; to 2 c.c. of this decimal dilution 4 c.c. of sheep antirabic serum is added, and 6 c.c. of the mixture injected daily for three days.

This method, originally used in the Cairo Institute, was modified in 1910, since which date patients are given daily, for the first three days' treatment, 10 c.c. of a mixture of equal parts of the decimal dilution and antirabic serum.

The antirabicidal value of the serum is controlled from time to time by injecting rabbits, after trephining, with a mixture of equal parts of serum and a centesimal solution of fixed virus (Dr. Marie's method). Animals so inoculated should not contract rabies.

Vaccination.—Until 1909 dried cord (Pasteur's

* Three persons, who presented themselves more than a year after the date on which they were bitten, were not treated.

† The discrepancy between the number of animals and the number of cases is due to the fact that frequently several persons were bitten by the same animal.

method) was used for vaccination, but subsequently Högyes' method of dilutions was adopted as being more suitable to warm countries. The dilutions originally used were five in number, as follows:—

Dilution 5 contained $\frac{1}{2}$ cm * in 5 c.c. of saline solution, or a dilution of 1 : 240.
Dilution 4 contained $\frac{1}{3}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 200.
Dilution 3 contained $\frac{1}{4}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 160.
Dilution 2 contained $\frac{1}{5}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 120.
Dilution 1 contained $\frac{1}{8}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 80.

In 1911 it was decided to intensify the treatment by commencing on the first day with dilution 3, without using the dilutions 5 and 4, but in some cases unpleasant symptoms occurred, and in 1912 a return was made to the use of the five dilutions, their respective strengths being somewhat reduced as follows:—

Dilution 5 contained $\frac{1}{3}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 280.
Dilution 4 contained $\frac{1}{4}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 240.
Dilution 3 contained $\frac{1}{5}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 200.
Dilution 2 contained $\frac{1}{6}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 160.
Dilution 1 contained $\frac{1}{8}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 120.

In 1913 the strength of the dilutions was again reduced as follows:—

Dilution 5 contained $\frac{1}{5}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 600.
Dilution 4 contained $\frac{1}{6}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 500.
Dilution 3 contained $\frac{1}{7}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 400.
Dilution 2 contained $\frac{1}{8}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 300.
Dilution 1 contained $\frac{1}{6}$ cm. in 5 c.c. of saline solution, or a dilution of 1 : 250.

In addition, use was made of cord which had remained at least twelve days in glycerine, and was therefore of slightly reduced virulence.

the advantages of a somewhat energetic treatment, it was decided to return to the system used in 1912, with the modification that the cord used is allowed to remain ten days in glycerine. The dilution of 1:280 corresponds approximately to the four-days dried cord used in Pasteur's method, and the dilution of 1:600 to the five-days dried cord.

The dilutions are injected in doses of 5 c.c. per day during fifteen or twenty-one days, their administration being graduated according to the severity of the bite.

Statistics.

As is the practice in other antirabic institutes, the statistics only comprise deaths occurring more than fifteen days after conclusion of the treatment. In the opinion of the principal writers on the subject, it is only towards the twentieth day after the treatment has been completed that immunity may be considered as being acquired. Deaths occurring before the lapse of this period are due to the virulency of the infecting virus, the severity of the bites, and delay in the application of the treatment. They should, therefore, strictly speaking, not be taken into account.

During 1915 two deaths were reported of patients treated in 1914, and two deaths occurred of persons bitten and treated in 1915. The table below gives details of these four cases. It is noteworthy that Case No. 5762, seriously bitten by a wolf, died of rabies more than five months after the accident.

The corrected mortality-rate, comprising only deaths which occurred more than fifteen days after the end of the treatment, thus representing the really unsuccessful cases, is 0·77 per cent.

Five deaths also occurred during treatment, or less than fifteen days after its completion. The gross mortality was therefore 1·72 per cent.

Two men also died of rabies without having undergone any antirabic treatment, the deaths being brought to the notice of the institute by the fact of patients contaminated by the above persons coming for treatment.

No.	Patient	Age	Date of bite	Position of bites	Nature and number	Bitten by	Dates of treatment	Date of death	Place of death
5762	Oada Yussef ...	14	Sept. 24, 1914	Left fore-arm	1 serious	Wolf	Sept. 25 to Oct. 15, 1914	March 1, 1915	Patient's residence.
5870	Mohammed 'Abd el Mon'eim	15	Nov. 8, 1914	Right index finger	2 fairly serious, 2 slight	Dog	Nov. 10 to Dec. 30, 1914	April 1, 1915	Patient's residence.
6010	Asbmed Mussa ...	20	Jan. 30, 1915	Left hand	4 slight	Dog	Jan. 31 to Feb. 20, 1915	May 19, 1915	Patient's residence.
6022	Hanna Mansûr ...	14	Feb. 5, 1915	Nose; right index finger	2 fairly serious, 3 slight	Dog	Feb. 7 to Feb. 27, 1915	April 4, 1915	Patient's residence.

The mortality-rate was somewhat large in 1914, and this fact, as well as numerous articles in the medical press, having both adequately demonstrated

* The weight of the rabbits being about 1,500 grammes, one centimetre of marrow represents approximately 12·5 centigrammes.

NOTE.

The system adopted for the classification of patients treated at the Cairo Institute is not absolutely the same as that in use at the Pasteur Institute in Paris.

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At the Paris Institute the patients are divided into three categories, viz., bites in the head, bites in the hands, and bites in other parts of the body.

In Cairo it appeared preferable to divide the cases into bites in the head, bites in uncovered parts of the body or limbs, and bites through clothing.

The reasons which have led to the adoption of the latter classification are the following:—

In France, persons bitten in the body, arms, or legs, are in the vast majority of cases bitten through clothing, and the only bites met with in naked skin are those of the head and hands.

In Egypt, on the other hand, where a large number of the population, especially children, are scantily clad, bites of the naked skin may occur not only in the head and hands, but also in other parts of the body (feet, legs, thighs, arms, shoulders, &c.).

Bites in the uncovered skin are more dangerous than bites through clothing, as the latter may either wholly or in part prevent the entrance of the virulent saliva into the wound. Bites in the uncovered skin therefore receive a special treatment and should be separately classified.

Up to and including the year 1914 the mortality-rate in the Cairo Institute has been calculated on the number of patients beginning their treatment in any one year and on the deaths occurring in the same year.

For the year 1915, and in future, the more correct method used by the Paris Institute will be employed for Cairo, so that the statistics for any one year will only refer to patients commencing their treatment between January 1 and December 31 of the year in question. The death of any patient will be included in the year during which he commenced his treatment, and not as previously according to the date of death.

While the results obtained in the Cairo Institute by the method now in use must be regarded as very satisfactory and compare favourably with those of other similarly situated institutes, no finality has been reached, and the question of the most suitable method is at present under consideration.

MEDICAL COMMISSIONS.

Cairo.

The number of certificates issued by the Central Medical Commission during the last year is 4,682.

The work of the Central Medical Commission is continually developing, and there is reason to believe that but for the present circumstances, which led to the number of appointments amongst Government officials being curtailed, the total of examinations for admission to the service would have been larger.

Provincial.

The eighteen Provincial Medical Commissions have conducted 7,249 medical examinations. This figure gives an increase of 2,942 as compared with last year.

PHARMACIES.

Seventy-one samples of medicines were taken and analysed with the following results:—

One warning was addressed to an unqualified proprietor at Alexandria.

Four *procès-verbaux* drawn up against qualified pharmacists, resulting in two sentences, and two cases still pending.

Nine *procès-verbaux* drawn up against unqualified proprietors, resulting in seven sentences, and two pending.

Twenty-five samples of medicines were found good.

One hundred and eight samples of *manzûl* were taken and analysed with the following result:—

Twenty-four *procès-verbaux* drawn up against vendors, resulting in five sentences, eighteen pending, and one acquittal.

Thirty-six samples of *manzûl* were found after analysis to be free from anæsthetic substances.

Eight authorizations to practise as pharmacists were issued to holders of the following diplomas: One Russian, one Greek, one American, and five Egyptian.

Two authorizations were granted to sell poisons, the total number in existence at the end of the year being seventy-two, after taking into account the closure of five establishments.

Fifty-one offences against the Pharmacy Law had the following result:—

Four warnings sent to qualified pharmacists.

Eight warnings sent to unqualified owners of pharmacies.

Thirty *procès-verbaux* drawn up against persons for the illegal practice of pharmacy and sale of poisons, resulting in twenty sentences, four acquittals, six pending.

Nine *procès-verbaux* drawn up against druggists, resulting in five sentences, four pending.

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REPORT OF THE HEALTH OFFICER FOR 1916.

By H. M. CRAKE, M.D., D.P.H.,

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CLIMATIC CONDITIONS.

THE weather in 1915 was distinctly abnormal. The most striking features of the meteorological records are the prolonged drought during the first quarter of the year, not a drop of rain falling from December, 1915, to March, 1916; the high maximum temperatures during March, April, and May; the sudden break in the rains in July and the prolongation of the rains right into October.

The total rainfall was 82·78 in as compared with

65·96 in. in 1915. The wettest month was August, when 18·94 in. of rain were recorded. From January to March, as already noted, no rain fell. December was also an absolutely dry month. June, with a heavy rainfall of 16·99 in., was followed by an exceptionally dry July, only 7·60 in. being recorded during the whole month, of which 5·11 in. fell in a single day. The deficit was rapidly made good in August with 18·94 in., September with 17·90 in., and October with 14·62 in. The heavy and continuous rain in the latter month was altogether unusual. The maximum rainfall recorded in twenty-four hours was 5·29 in. This occurred in September. The hot weather set in exceptionally early, and was prolonged for fully three months. In place of the normal rise to a maximum in April, followed by a gradual decline, the temperature rose rapidly to 95·8° F. (average maximum) in March, and remained well over 97° F. during April and May, reaching a maximum of 97·9° F. in the latter month. These excessive maximum temperatures affected the mean temperature during the hot weather, but the minimum temperature remained about normal. The mean daily range was particularly marked, the difference between the maximum and minimum temperature in March being over 25° F. The barometer gave very low readings in June. With this exception the pressure curve was fairly normal. The prevailing direction of the wind was as follows: January and February, N.W.; March to July, S.W.; August and September, S.E. (almost due S. in September); October, N.E.; November and December, N.W.

Vital Statistics.

Death-rates.—The number of deaths registered during the year was 22,098, or 24·7 per mille, calculated on the census population of 1911. *This is the lowest death-rate ever recorded in Calcutta.* The lowest rate previously registered was 27·2 in 1911. Compared with 1915, when 25,590 deaths, equivalent to a death-rate of 28·5 per mille occurred, the improvement is very remarkable, and represents an actual saving of nearly 3,500 lives. Calculated on the mean population for the year, estimated at 922,490, the death-rate for 1916 was only 23·9. As I have previously pointed out, however, calculations based on the increase of population during one inter-censal period are not exact, owing to the fact that there is no natural increase of population in Calcutta, the population being replenished entirely by immigration. The above death-rates are, of course, "crude," and no corrections have been made according to the age, sex, distribution of the population, nor for deaths amongst recent arrivals. The latter correction is not made, as no information is available regarding the number of Calcutta residents who die outside the city. It would obviously be incorrect to exclude the one without adding the other. In fact, a "corrected death-rate" cannot be calculated in India, as the factors for correction which in England are calculated by the Registrar-General are not available here. The crude rate is of great value for comparing one year with another, but is useless for comparing Calcutta with other cities. Owing to the peculiar constitution of its population, which comprises a large excess of young adult males, the corrected death-rate would undoubtedly be made higher than the crude death-rate. As approximately 10 per cent. of the total mortality occurs amongst recent arrivals, this alone would be a very substantial set off against the rise which would be produced by applying other factors of correction.

Urban and Suburban Death-rates.—The death-rate in the urban wards, i.e., that portion of the city lying within Circular Road, was 22·1, whereas in the suburban wards it was 30·5. To anyone with local knowledge of some of the suburban wards with their defective drainage, thousands of tanks nd large bustee population, this is not surprising. Suburban wards with a mean death-rate during the last five years of 47·8 per mille and with mean death-rates of 32·2, 34·8, and 34·2 per mille are a blot upon the municipal administration of the city. I strongly support Babu Pasupati Nath Deb's suggestion that money spent on improvements should be allotted to wards in proportion to their death-rate. If this was done these backward areas would soon become healthy.

Principal Variations in Causes of Deaths.—The principal infectious diseases—plague, cholera, and small-pox—caused 1,471 deaths, as compared with 4,363 deaths in 1915. Whilst this great reduction in mortality is largely due to the absence of epidemic small-pox, which caused 2,560 deaths in 1915, it is by no means solely due to this cause. The number of deaths from cholera was only 1,335, as compared with 1,612 last year, whilst plague caused only 78 deaths against 191 in 1915. The mortality from cholera was the lowest recorded since 1900, whilst the mortality from plague was the lowest recorded since this disease first appeared in the city.

Local Variations.—As I have previously pointed out, remarkable variations occur in the death-rates of different wards. The constitution of the population shows that most of the very low death-rates, e.g., for the fort, the port, and the canal, are due to the fact that the population consists almost wholly of males, women, and children being almost entirely absent. To a lesser extent this also applies to wards where males outnumber females. For Wards 16 and 17, a first-class European residential quarter, the death-rates were 7·7 per mille and 13·4 per mille respectively. This apparently enormous difference is due to the small population in Ward 17, and a more correct death-rate is arrived at by combining the two wards, as the local conditions are absolutely identical. This gives a death-rate of 9·8 per mille, and making every allowance for the very special conditions under which Europeans of the better class reside in Calcutta, it is a very satisfactory death-rate indeed. Ward 12, a business centre, with very few women and children, with a death-rate of 9·5 per mille, completes the list of wards with rates of 10 per mille or under. In other wards, in which the local conditions are totally different, but where the

excess of males over females is above the normal, the death-rates were under 20 per mille. The most remarkable improvement, however, has occurred in the wards notorious for high death-rates. For the first time since accurate records were kept, not a single ward in the city had a death-rate of 40 per mille, and only three wards had a rate exceeding 30 per mille. The principal causes of high mortality rates were malaria, dysentery, cholera, fevers, tubercle, and respiratory diseases.

Death-rates amongst Males and Females.—The death-rate amongst males was 20·5 per mille, whereas amongst females it was 33·3 per mille.

Although these death-rates are high, it is satisfactory to note a decided improvement within the last couple of years.

In 1914 there were eight wards with female death-rates of 40 per mille and over; in 1915 there were three, and in 1916 only two. I am still of opinion that the observance of the purdah system, in a great city, is very largely responsible. As I have repeatedly pointed out, this custom not only involves the constant exposure of women to insanitary conditions, but actually leads to the construction of ill-lighted and ill-ventilated buildings in order to secure privacy to the zenana.

Death-rates amongst Different Classes.—The death-rates amongst the three main sections of the community were: Hindus, 25·2 per mille; Mahommedans, 23·9 per mille; and Christians, 24·1 per mille.

These are somewhat unusual figures, and I have never known the death-rates for the different communities approximate so closely. In previous years the death-rate amongst Christians has always been considerably lower than that amongst either Hindus or Mahommedans.

Seasonal Variations in the Death-rate.—The average mortality-rates varied from 22·4 per mille to 34·9 per mille, those for 1916 touched the remarkably low figure of 19·4 per mille in June, and never exceeded 28·6 per mille at their highest. The average mortality figures graphically expressed exhibit a well-defined curve, which falls to a minimum in the rains, and rises during the cold weather to its maximum in the hot weather. This is the normal seasonal variation in Calcutta. In 1916, owing to the exceptionally low mortality from infectious diseases, which invariably reaches its maximum in the hot weather, the highest death-rates were recorded in the cold weather months, January and December, instead of in March and April. Broadly speaking, the end of the rains is followed by increased mortality from fevers. Then comes a rise in the mortality from respiratory diseases, and an increase in the number of deaths amongst children and old people during the cold season. This in turn is followed by a rise in the mortality due to the infectious diseases, plague, cholera, and small-pox. The rains are undoubtedly the healthiest season of the year. Whilst there are unhealthy sequelæ in the shape of mosquitoes and dampness of dwellings, particularly huts which cause a great deal of sickness, the cleansing and scouring effect of the rains is unquestionably of the utmost value.

Mortality at Different Ages.—The number of deaths amongst infants under one year of age was 4,669; calculated on the number of births registered, this is equivalent to an infantile mortality-rate of 249 per mille. This is the lowest infantile mortality-rate ever recorded in Calcutta, with the exception of 1890 and 1891, when there was obviously some serious fault in registration. Whilst the reduction in the rate of mortality is partly due to the increase in the number of births registered this year, there has been an actual decrease in the number of infant deaths as well. In 1915 there were 16,578 births registered and 4,768 infantile deaths, the mortality-rate being 287·6 per mille. This year there were 18,737 births registered, but only 4,669 infantile deaths were recorded, the mortality-rate being 249 per mille. In view of the steady decline in the birth-rate from 21·6 per mille in 1912 to 18·5 in 1915, which resulted in a corresponding rise in the infantile mortality-rate in spite of an actual decrease in the number of infantile deaths, the birth-rate of 20·9 recorded this year is very satisfactory. It is significant, however, that the marked improvement noted this year coincides with the introduction of more systematic house to house visitation.

The death-rate for males of all ages was 20·5 per mille, a marked improvement compared with last year's rate of 24·1 per mille.

As in previous years, the age-period 10—15 years shows the lowest death-rate, 7·3 per mille, and the age-period 60 years and over the highest, 96·4 per mille. Compared with 1915 the mortality-rates show a remarkable all-round reduction. There are over 600,000 males in Calcutta, or more than two-thirds of the entire population, and half of these men in the prime of life, from 20—40 years of age. With death-rates of from 7·3 to 11·9 per mille occurring amongst two-thirds of the male population, obviously high rates must occur amongst other sections to bring the general mortality-rate up to 24·7 per mille.

The death-rate amongst females of all ages was 33·3 per mille, compared with 37·8 per mille in 1915. Whilst it is satisfactory to note that the mortality amongst females declined by 4·5 per mille as compared with a reduction of 3·6 per mille in the mortality amongst males, a death-rate of 33·3 per mille compared with the rate of 20·5 per mille amongst males is a truly appalling figure.

Comparing this with that given for males, a very remarkable state of affairs is revealed. The *excessive mortality amongst females is almost wholly confined to the age-periods* 15 *to* 40 *years.* That is to say, it occurs amongst females in the prime of life, and what is of such vital importance, capable of bearing children. At ages 10—15 the mortality amongst females is nearly 50 per cent. higher than amongst males, whilst from 15—40 years it is considerably more than double! The causes of this

appalling loss of life, which is even greater than it appears, when one considers the number of children which these prematurely deceased women might have brought into the world, are well known, and have repeatedly been drawn attention to in previous reports.

Infantile Mortality.—The infantile mortality-rate for the city was 249·1. It naturally varies considerably in different localities, and in some instances fluctuates from year to year in an inexplicable manner. Jorabagan has always been noted for its high rate of infantile mortality. This extremely congested quarter, with its masses of buildings, the majority of which are overcrowded, ill-lighted, and ill-ventilated, is obviously inimical to child-life. The suburban wards, though far less congested, contain thousands of damp, dark, dirty huts, surrounded by grossly insanitary conditions.

Out of 4,669 infantile deaths, 1,735, or 37·1 per cent., occurred during the first week. During this week the principal causes of death are premature birth (577 out of 1,735), and congenital debility (644 out of 1,735). These alone were responsible for 70 per cent. of the deaths amongst infants who survived less than seven days. Social and economic factors, particularly poverty, the strain of early and repeated pregnancy, prolonged lactation, constant exposure to insanitary surroundings, &c., all tend to weaken and debilitate the mother and puny sickly babies are the result. The other important cause of infantile mortality during the first week is tetanus neonatorum (380 deaths out of 1,735). It is even more deadly amongst babies from seven days to one month old, when it was responsible for nearly 50 per cent. of the deaths (442 out of 976). This is an entirely preventable disease due to dirty midwifery. There has never been a single case amongst the hundreds of cases attended by the municipal midwives; this shows clearly that it is the unqualified midwife or *dhai* who is entirely to blame. It is carrying respect for ancient customs and prejudices too far when toleration kills over 800 babies a year. A Midwives' Board, Registration of Midwives, and absolute prohibition of unqualified practice ought to be brought into operation as soon as possible. The other important cause of death at this period is bronchitis (220 deaths out of 976). It is the principal cause of infantile mortality in Calcutta, and causes over 30 per cent. of the total. Most of these deaths are due to sheer ignorance and carelessness, as the climate of Calcutta is by no means severe. The children of the poorer classes are mostly insufficiently clad, in many cases the hot weather costume of a film of oil and a piece of string being considered quite sufficient for the rains and cold weather.

A striking feature of the infantile mortality returns in Calcutta is the small proportion of deaths from diarrhœa and enteritis. This is due to the fact that very few infants are artificially fed.

In the Annual Report for 1915 I gave a brief description of "baby clinics" as organized in England, and sketched out a scheme for inaugurating work on these lines in Calcutta. As I was fully aware of the great difficulties to be contended with in Calcutta, I enlisted Miss Webb's co-operation. The Lady Superintendent, Dufferin Hospital, volunteered to open a small babies' clinic in connection with the hospital. As soon as this was established it was hoped that it would gradually be extended to the babies brought into the world by the municipal midwives. Once this stage was reached, special baby clinics, in charge of trained nurses, with expert medical advice available on stated days, and arrangements for supplying humanized milk, &c., would have been started all over the city. Unfortunately, Miss Webb reports that all attempts to induce mothers to bring their children to Dufferin Hospital for regular examination have failed. When women who have personally experienced the advantages of hospital treatment cannot be induced to bring their babies to a clinic, there is obviously very little hope of ever inducing women who have never seen the inside of a hospital to bring their babies. The lady health visitors did their best to persuade mothers with sickly ailing children to bring them to their quarters for advice and treatment without success. The only alternative was for the health visitors to regularly visit all the babies delivered by our midwives. As their time is fully occupied in supervising the work of the midwives, it was necessary to fix a limit to the period the babies were kept under observation. This was arbitrarily fixed at three months, and as far as possible regular weekly visits were paid from the tenth day. During the first ten days all cases are visited daily by the midwives, and at least once by the health visitors. As the number of babies on the list increased it was found impossible to visit them all every week, and those that appeared to be doing well were only visited once or twice a month. A detailed account of this branch of the health visitors' work is given later on. The results are very encouraging, and it is well worth considering whether additional health visitors should not be appointed to take charge of this portion of the work. From the experience already gained it is very evident that the babies require to be looked after for longer than three months, but this cannot be done with the present staff. As Miss Webb points out, the ideal to be aimed at is a Maternity and Child Welfare Section in charge of a member of the Women's Medical Service. Under her would be the present staff of health visitors and midwives and the extra staff required for child welfare work.

Infantile mortality according to nationality varies very greatly. The highest rate, 300 per thousand births, was recorded amongst Mahommedans, and the lowest rate, 98 per thousand, amongst non-Asiatics. The latter figure, however, is based on very small numbers. This also applies to the rates given for "mixed" and "other classes." Probably a more correct figure is that obtained by combining these three sections of the population, the combined rate being 149 per thousand births.

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Birth-rate.—The number of births registered in 1916 was 18,737, a birth-rate of 20·9 per mille of the population. This is a very substantial increase compared with 1915, the corresponding figures being 16,578 and 18·5 per mille. It is particularly satisfactory, as the birth-rate has been slowly declining for several years past. As I have already pointed out, a part at any rate of this decline may have been more apparent than real owing to defective registration; on the whole a comparatively small proportion of births escape registration. One of the most striking features of the statistics of births in Calcutta is the seasonal variation in the birth-rate, the largest number of births occurring in the cold season and the smallest in the hot weather. Birth-rates calculated on the total female population, or preferably on the number of women of child-bearing age, are obviously of far greater value.

The number of still-births, 1,101, or one out of every seventeen births, is very high. Making every allowance for neglected and badly conducted labours, such a high proportion of still-births undoubtedly means that syphilis is very prevalent.

PRINCIPAL CAUSES OF DEATHS.

Plague was hardly prevalent in epidemic form at all. Only seventy-eight deaths were recorded, i.e., less than half the number that occurred last year. The city was declared free of plague on July 16, and remained free to the end of the year.

The cholera returns also show a remarkable diminution. The mortality during the last two years has been lower than at any time during the last sixteen years.

There were only fifty-eight deaths from small-pox.

The mortality from fevers (including malaria and enteric) was 2,887, or 3·2 per thousand. This is slightly less than in 1915, the difference being due to the diminished prevalence of malaria. Enteric fever was, however, more prevalent than in 1915. The increase is relatively small, and the mortality was considerably below the quinquennial average of 300 deaths per annum.

The mortality from dysentery and diarrhœal diseases, including enteritis and puerperal diarrhœa, was 2,487, or 2·8 per mille, against 2,843, or 3·1 per mille in 1915. This is extremely satisfactory, particularly as the most marked reduction has occurred in the mortality from dysentery.

The mortality from tuberculosis shows a most remarkable decline from 1,920 deaths in 1915 to 1,738 in 1916. As the average mortality for the last five years was 2,049, this sudden decline is extremely satisfactory.

Respiratory diseases (excluding pulmonary tuberculosis) show a slight decrease from 4,827 deaths in 1915 to 4,707 deaths in 1916.

Measles, which has a well-marked cycle, becoming epidemic every third year, caused 191 deaths. As 1916 was an epidemic year, this compares very favourably with the last epidemic in 1913, when 386 deaths occurred. In 1915, a non-epidemic year, only fifty-two deaths were recorded.

Plague.

The mortality from plague has been rapidly diminishing for some years past, and has now reached a point at which it ceases to count as an appreciable factor in the vital statistics of the city.

There were only eighty-two cases and seventy-eight deaths during the year as compared with 204 cases and 191 deaths in 1915.

The first two cases occurred in January, 1916, and were both imported from Bombay. These were followed by three sporadic cases in February, which apparently had no connection with the imported cases. The disease was never prevalent in epidemic form. In March only fourteen cases were recorded, all of which ended fatally. The outbreak reached its height in April (thirty-three cases and thirty-two deaths) and declined in May (twenty-one cases and twenty-one deaths), and was practically over in June (six cases and five deaths). There were three cases and two deaths in July and none thereafter.

The mortality was almost wholly confined to Hindus, amongst whom seventy-one deaths were recorded, as against four among Mahommedans, and three among other classes. There were sixty-one deaths among males and seventeen among females, the corresponding figures in the previous year being 140 and 51. Females seem to have suffered somewhat less than in the previous year. As in 1915, about half the total number of cases occurred among persons between 10 and 30 years of age.

Out of eighty-two cases recorded during the year, seventy-three were of the bubonic type, and nine of the septic variety.

There was only one inoculation against plague during the year, and so far as is known no deaths occurred among persons who had been inoculated previously.

The rat mortality was also considerably less than in the previous year, about 50,000 dead rats having been reported, as against 65,000 in the previous year. As usual, about two-thirds of the mortality occurred in District I, but unlike the previous year, when more than half the rat mortality occurred in the first three months of the year, the figures were distributed over a much longer period. Nearly 139,000 live rats were destroyed, about the same as last year. Nearly the whole of the rat-catchers' activities are confined to District I, where the supply of rats seems inexhaustible owing to the number of dal-golas which exist, and it is a matter for consideration whether it is worth while continuing this apparently futile but by no means inexpensive campaign against rodents.

Cholera.

The total number of deaths from cholera was 1,335, or 1·5 per mille. This is the lowest figure recorded since 1899. The improvement during the last ten years is very striking.

Cholera is endemic in Calcutta, and cases occur

throughout the year. It usually assumes an epidemic form in the latter part of the cold and the beginning of the hot season, the acute phase being confined to March, April, and May. The most striking features of the epidemics of 1915 and 1916 was the delayed onset of the acute phase and the rapidity with which it rose to a maximum and declined. This conveyed a false impression that the epidemic was a severe one. During the whole of January and February, save for a temporary rise towards the end of January, the mortality was greatly below the average. In the first week in March the mortality suddenly rose to twenty-five deaths, nearly double that of the preceding week. By the following week it was forty-two, and the epidemic was in full swing. During May and June the weekly mortality fluctuated between thirty and sixty, suddenly declining to fourteen during the last week of June.

Local Incidence.—In previous years the suburban wards, particularly those grouped round Tolly's Nullah and the riparian wards, both urban and suburban have always suffered most severely. The water-borne origin of a great deal of the cholera in Calcutta is clearly shown by the fact that the urban ward with the highest mortality-rate is riparian and the suburban ward which suffered most severely borders on Tolly's Nullah. A number of explosive outbreaks occurred, due to polluted tanks. A considerable amount of cholera also occurred in bustees in the fringe area, in the vicinity of tanks. With thousands of service privies still in existence, contamination of food-stuffs by dust and flies probably plays an important part in the dissemination of the disease. The ignorance and carelessness displayed in the disposal of infected discharges, soiled linen, &c., from the thousands of cases of cholera and enteric, which are treated at home instead of being promptly removed to hospital, makes the control of the epidemic in Calcutta a difficult task. The carrier problem, with its possibilities of direct contamination of food-stuffs by those engaged in handling and preparing them, is another source of infection almost impossible to control without the whole-hearted co-operation of the medical profession and the entire population.

The heavy incidence amongst Hindus has always been a marked feature of the cholera returns. This year it was more pronounced than usual. Hindus suffered more than twice as severely as Mahommedans. The incidence amongst males and females was almost identical. The chief point of interest regarding the age incidence is that excluding infants who are obviously not liable to infection, the incidence amongst children under 10 years was one in 444, whereas, from 10 to 20 years it was only one in 1,016. From 20 to 40 years it was one in 800.

The number of deaths recorded as due to smallpox was only fifty-eight, equivalent to a mortality-rate of 0·06 per mille. The cases were all scattered sporadic ones. With the exception of an imported case in November, the city was absolutely free from small-pox from July to December. Hindus and Mahommedans and males and females were attacked in about equal ratios. Approximately one-third of the cases occurred amongst infants and children, who form one-eighth of the total population.

The number of deaths from measles was 191, or 0·21 per mille, as compared with fifty-two, or 0·05 per mille in 1915. Attention has already been drawn to the cyclical character of epidemics of measles in Calcutta, this disease assuming an epidemic form every third year, with two non-epidemic years intervening. Compared with the epidemic of 1913, which caused 386 deaths, the outbreak in 1916 was comparatively mild. Measles, like most of the epidemic diseases, is most prevalent during the first few months of the year. The epidemic of 1916 commenced in February, developed in March, reached its height in April, and was over by the end of May. The mortality rose to ten deaths a week in the middle of March, and touched ten deaths a week at its maximum in April.

During this epidemic 17 per cent. of the cases occurred amongst infants, 65 per cent. amongst children of 1 to 5 years of age, and 10 per cent. amongst children of 5 to 10 years. Hindus appear to be much more susceptible than Mahommedans. Females are slightly more susceptible than males.

Enteric.

The number of deaths recorded as due to enteric was 227, or 0·25 per mille, a slight increase compared with last year's figures. This compares favourably with the average for the last five years, but it is disappointing to find that the gradual decline in the mortality, which has been taking place since 1912, when the mortality-rate was 0·40, has been interrupted.

Seasonal Variations.—This is not particularly well marked as a rule. Enteric occurs throughout the year, but a study of the quinquennial average figures shows a slightly increased prevalence at two periods. The first rise takes place in March, April, and May. The second, a less marked and slighter one, occurs in September. In 1916 a very slight increase in the mortality occurred in April and May, when twenty and twenty-one deaths respectively were recorded. The mortality then dropped in June and July, to be followed by a sudden and well-marked rise in August, when thirty-four deaths occurred. The acute phase of the outbreak rapidly subsided, but the mortality was above the monthly average during September and October. It seems highly probable that the sudden rise in the mortality in August was largely due to the very abnormal weather conditions in July, when a bad break occurred in the rains.

Age, Sex, and Caste Incidence.—Males and females appear to be equally susceptible. Over 80 per cent. of the total mortality occurred amongst persons under 40 years of age. The increased susceptibility of the young is shown by the fact that more than half the deaths from enteric occurred amongst children and young adults under 20 years of age.

The incidence amongst different sections of the population shows remarkable variations. The apparent immunity of Mahommedans has always been a striking feature in the records of enteric in Calcutta; even after making every allowance for concealment of cases, there seems less susceptibility amongst this section of the community.

Local Outbreaks.—An explosive outbreak occurred in a large boarding-house in the European quarter. Altogether nine cases occurred, of which two proved fatal. As there were only forty-two persons residing in the three buildings which form the boarding-house, the attack rate was very high. Nearly all the cases were almost simultaneously infected about the middle of August. A most careful investigation involving bacteriological examination of water supply, of the blood of over two dozen servants, and of the boarding-house keeper, inspection of dairies supplying the milk and inquiries as to sickness amongst customers, &c., were made with negative results. The only serious sanitary defect was in the arrangements of the water tanks, the unfiltered water tank being placed almost on top of the filtered water underground reservoir. Bacteriological examination confirmed one's suspicion as to the danger of this arrangement, which was promptly altered. It had nothing to do with the enteric outbreak, however, as several cases occurred in buildings which were not supplied from this reservoir. Whilst the bulk of the milk came from an excellent dairy and appeared to be above suspicion, a small quantity was taken from a *goala*. This was produced and handled under unsatisfactory conditions, and in all probability the infection was conveyed through this medium.

Another local outbreak occurred in the Loreto Convent, Entally. Here there were ten cases, two of which proved fatal. As there are nearly 700 girls, the attack rate was only a fraction of that in the other local outbreak. The cases occurred in July and August, chiefly in the latter month. Here also no definite cause could be traced. The sanitary arrangements were all excellent. Milk produced on the premises was all boiled before use. Water tanks were all scrupulously clean and protected from contamination. The proximity of a large insanitary bustee and a swarm of flies buzzing round the kitchen suggested an obvious source of infection, but the most searching inquiry failed to discover a single case of enteric in the bustee. Unfortunately the investigation into this outbreak was commenced at a late stage, as no intimation was received at the beginning.

The ætiology of the disease in Calcutta is a complicated problem. The majority of the cases are treated in their own homes, without trained nurses and without being strictly isolated. In all probability many unrecognized cases occur. The discharges and soiled linen of the patient are not promptly disinfected, and drinking vessels, &c., are used by other members of the household. These conditions obviously favour the spread of the disease either by direct contact or through the infection being carried by flies, in dust, &c. Then there is the " carrier " problem, which I am convinced plays an important part, particularly when the carrier handles and prepares milk and other food-stuffs. In a small series of cases under investigation at the time of writing the evidence points unmistakably to the cook being a carrier. When one considers that (*a*) persons in the incubation stage, (*b*) persons suffering from mild, typical, or ambulatory typhoid, (*c*) convalescents, (*d*) healthy contacts, are all liable to become carriers, the importance of this factor in the ætiology is obvious.

Malaria.

The number of deaths recorded as due to malaria was 1,126, or 1·3 per mille, compared with 1,258, or 1·4 per mille in 1916. The sudden alteration in the classification adopted by the District Health Officer vitiates the returns and makes any comparison difficult.

Sex and Caste Incidence.—As in previous years Mahommedans suffered much more severely than Hindus, the mortality-rates per thousand being 1·0 and 1·9 respectively. This is probably due to the fact that Mahommedans form the bulk of the population in some of the malarial suburban wards. The heavy incidence of malaria amongst females is another striking feature of the returns, the mortality-rate being 1·7 per mille amongst females, as compared with 1·0 per mille amongst males. It is difficult to account for this, as, if anything, males are more exposed to infection than females. Probably a certain number of cases occur amongst unattached males, who, judging by one's own servants, promptly return to their native villages.

Other Fevers.

The mortality under this very unscientific heading, which, however, cannot be eliminated from our vital statistics for many years to come, was 1,534, or 1·7 per mille. As in the case of dysentery and diarrhœa, a change has been made in the system of classifying this group, which now includes puerperal fever, formerly included under " other causes."

Whilst the bulk of the cases are probably unrecognized forms of well-known diseases not diagnosed owing to their typical symptoms, or because they were not under qualified men, it is quite possible that still undifferentiated tropical diseases are included under this heading.

Dysentery and Diarrhœa.

The figures for 1916 given under this heading include cases of enteritis and puerperal diarrhœa (chronic *sutika*), which in previous years were shown under " all other causes." The change has been made for facility of work in connection with the recently introduced card system of keeping statistics, and also with a view to classify some of the diseases making up the heterogeneous group

designated "other causes," and accounting for 8,000 to 9,000 deaths a year.

The total number of deaths from dysentery, diarrhœa, enteritis, and puerperal diarrhœa amounted to 2,487, giving a ratio of 2·8 per mille, as against 2,843, or 3·1 per mille in 1915.

Seasonal Variations.—These are particularly well-marked. Taking dysentery alone, this was most prevalent in January (157 deaths). The mortality then dropped to between 130 and 140 from February to May, and declined to a minimum in June (97 deaths). From July to November it fluctuated between 120 and 130, and then suddenly rose to 182 in December. The remaining diseases included in this group—diarrhœa, enteritis, &c.—were least prevalent in February (25 deaths). A rapid rise to a maximum in May and April (89 to 90 deaths) occurred, followed by marked fluctuations between 50 and 80 from June to November. Finally a sudden rise in December, equal to the true maximum in March and April and only lasting a month, occurs.

Sex Class and Age Incidence.—Taking all the diseases included in the group together, the rate of mortality works out to 2·1 among males and 3·6 among females. Hindus suffer more than Mahommedans, and the mortality from diarrhœa and enteritis among other classes is higher than among either of these communities. Nearly half the deaths from dysentery occur among infants and children under 10 years and among old persons of 60 years and upwards. Infants and children under 5 years contribute more than half the mortality from diarrhœa and enteritis.

Tuberculosis.

A further decline in the mortality from tuberculosis took place. The mortality has been steadily declining year by year since 1913, the reduction amounting to over 20 per cent. in three years. Attention was directed last year to the unusually large proportion of non-pulmonary tuberculosis. The reduction in the mortality from tubercle appears to be mainly due to the diminished prevalence of these non-pulmonary forms, as pulmonary tuberculosis was slightly more prevalent than in 1915. Although there has been no further reduction in the mortality from pulmonary tuberculosis this year, the figures compare very favourably with the quinquennial average of 1880, the decline being equivalent to over 16 per cent., or nearly one-sixth.

The general prevalence of tuberculosis in all parts of the city, with the exception of Wards 16 and 17, is due to the fact that at any given moment there are thousands of cases, living in ill-ventilated rooms and spreading infection by spitting promiscuously all over the place. In the suburbs the poorer classes, weakened by want of sufficient food and crowded into damp dark huts, suffer severely in spite of the comparatively low density of population. In the town, although the relation between density of population and the mortality from tuberculosis is not absolute, the high proportion of insanitary buildings and the degree of site crowding which is to be found with high mortality-rates indicates very clearly that the incidence of tuberculosis in Calcutta, as elsewhere, is intimately associated with insanitary housing conditions.

Seasonal Prevalence.—The mortality from tuberculosis was highest during the months of March and May, and lowest in September and October. Broadly speaking, the number of deaths from tuberculosis is low during the rains, rises steadily right through the cold weather, and reaches its maximum in the hot weather.

Age, Sex, and Class Incidence.—Females suffered exactly twice as severely as males from pulmonary tuberculosis. The explanation seems fairly obvious, although it is often strenuously denied. Insanitary housing is the most important factor concerned in the ætiology of tuberculosis. Owing to the observance of the purdah, thousands of women can only very rarely escape from their insanitary surroundings. The consequence is that they die off twice as rapidly as the men, who can and do escape from their insanitary homes every day of their lives. Women are, of course, more or less confined to the house by domestic cares, apart altogether from the question of purdah, and thus are more liable to be affected by insanitary conditions, such as want of light and air, but I am convinced that a great deal of the tuberculosis amongst women is directly connected with the observance of the purdah in a great city. The heaviest mortality-rates occur amongst young women of child-bearing age. This is the saddest feature of tuberculosis in Calcutta.

It seems almost incredible that five times as many young women of 15 to 20 years of age should die of tuberculosis as compared with young men of the same age.

Respiratory Diseases.

There has been a steady decline in the mortality from respiratory diseases since 1913. It is obvious that the factors which were responsible for the improved death-rate in 1916 had little or no effect on respiratory diseases generally.

Bronchitis is responsible for two-thirds of the total mortality from respiratory diseases, and the mortality from it was practically the same as in the previous year.

Seasonal Prevalence.—The seasonal distribution in 1916 corresponded closely to the records of previous years. Respiratory diseases are most prevalent during the cold weather, when the prevailing winds are from the north and when the temperature is relatively low, but what is of much greater importance, when the daily variation between maximum and minimum temperatures is most marked. Whilst humidity is much less than in the rains it is rarely below 65. It is apparently this combination of a considerable amount of moisture in the air, together with the sudden drop in temperature as the sun sets, which appears to be an important factor in the incidence of these diseases.

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The mortality among females was 50 per cent. in excess of that among males; the difference appears almost wholly due to the increased mortality among female children from acute bronchitis. Mahommedans have a higher mortality from respiratory diseases than Hindus and other classes. Mahommedans seem to suffer more from chronic bronchitis than Hindus, and there appears to be also slightly increased susceptibility to acute bronchitis among Mahommedan children.

An outstanding feature of the returns is the preponderance of respiratory diseases among children under 5 years, specially infants, and among old persons over 60. The causes are acute bronchitis in the case of children, and chronic bronchitis and pneumonia in the case of old people.

Acute bronchitis is one of the principal causes of infantile mortality. Practically the whole of the deaths from acute bronchitis occur amongst infants and children under 5 years. The mortality-rate, as one would naturally expect, is much higher in the older age groups.

One of the most important causes of the high mortality from respiratory diseases is the scanty and quite inadequate clothing worn by the poorer classes. I am quite sure that this is the chief reason why so many babies die from respiratory diseases. Another custom, that of bathing with the clothes on and travelling considerable distances in wet clothes, is also responsible in my opinion for a good deal of sickness.

Work of the Sanitary Inspectors.

The activities of the sanitary inspectors, of whom there are nineteen, are directed towards the abatement of nuisances and the improvement of insanitary property. This is done in various ways—ordinarily by the service of a notice, followed by prosecution in case of default, by the refusal of licence pending improvements in cases requiring a licence from the Health Department, by summary prosecutions in urgent cases, and sometimes by means of warning only. A suggestion was made during the year that owing to the difficulty of obtaining materials and the high prices thereof, all sanitary improvements, particularly house drainage and privy conversion cases, should be suspended for the present; the General Committee, however, directed that comparatively costly improvements in small houses belonging to persons of limited means should not be pressed. Following these directions even after the service of notice, every consideration is shown to parties by extension of time for compliance, postponement of prosecutions and otherwise, in cases in which the requisition entails any hardship. On the other hand, greater attention has been paid to the enforcement of minor and inexpensive improvements, such as repairs to house drains, privies, &c., improvement of food shops, removal of jungle and noxious vegetation, &c.

The total number of prosecutions instituted during the year was 7,407, as against 8,005, and nearly 500 fewer prosecutions.

Improvement of Insanitary Buildings.—The results of systematic house-to-house survey and action inaugurated have shown the possibility of improving fairly large groups of insanitary property, and there has recently been a certain amount of activity in this direction. Two sub-committees have been appointed for dealing with objections to notices. The committees hear the objections on the spot, and modify the requisitions, whenever possible, in order to suit the special needs and interests of individual owners. One great merit of the procedure is that it gives owners of insanitary property a chance to improve their houses at comparatively little expense, and does not involve any disturbance of the population or eviction from ancestral dwellings to which people so passionately cling. The drawback is that the procedure is very dilatory. The total number of buildings taken up for improvement since the commencement of the operations up to the end of the year is sixty-nine, and in fifty-three of these cases the required improvements have been completed. The proposal to provide two garden plots has been approved by the Corporation, but has been held up for want of funds.

Improvements in Private Markets.—Excluding the two markets belonging to Government, there are fifty private markets and bazaars in the city, of which seventeen are registered under the Calcutta Markets Act of 1871, and are exempted from the necessity of taking out a licence every year, and the remaining are licensed annually.

The improvements generally enforced are the paving of floors and the provision of proper drainage, the widening and proper maintenance of approaches and passages, removal of obstructions, periodical lime-washing, provision of water supply and ventilation, &c.

Viewing the year's work as a whole, it must be admitted that a considerable portion of the apparent activity has been directed towards the rectification of minor defects, and there is scope for a more vigorous policy of improvement not only with reference to immediate needs, but also with an eye to probable future requirements. Unfortunately, our activities are circumscribed by the law which prescribes the nature of our requisitions, and I despair of our ever bringing the private markets of Calcutta to the level of modern requirements by action under the Municipal Act unless the proprietors themselves will take a more liberal view of their duties and responsibilities, as they have been obliged to do in some recent instances by pressure of extraneous circumstances.

Food Inspection.

The year's work in connection with food inspection presents very few features of special interest. The routine of work prescribed in the reorganization scheme is being followed, complete lists being maintained of markets, shops, eating-houses, &c., and inspections being regularly made. This only helps

to systematize the work of the food inspectors, but the real difficulty, which is legal, in the way of a more vigorous campaign against the adulteration of food-stuffs remains unsolved.

The actual record of work done during the year compares favourably on the whole with the previous year. The total quantity of unwholesome food-stuffs destroyed by the food inspectors amounted to rather less than in the previous year. The decrease was due to the destruction of a smaller quantity of milk, ghee, flour. On the other hand, a much larger quantity of vegetables and grains was destroyed. Besides the above articles, 12,704 tins of tinned food, 884 bottles of drinks, and 3,042 eggs were condemned and destroyed.

Meat Inspection.—6,000 lb. of meat, 2,809 livers, and 1,856 lungs were destroyed at slaughter-houses. Altogether over 100 tons of unwholesome food-stuffs were destroyed during the year, i.e., about two tons every week.

Inquiry regarding Milk Supply.—The investigation in connection with the milk supply by an officer of the military dairy farms has been completed.

The question of giving the Corporation powers to license and control cowsheds and dairies outside Calcutta which supply milk to the city was considered by Government during the year. The majority of the municipalities in the neighbourhood of the city are, it appears, unfavourably disposed towards the proposal. The matter will be further considered by the Milk Supply Special Committee when the final report is received.

Inquiry regarding Manufacture of Butter.—A wholesale dealer of Sir Stuart Hogg Market, whose butter was found to be adulterated with both foreign fat and excess of moisture, and who was therefore prosecuted and fined, represented that the standard in use in the Corporation laboratory for testing butter should not be applied to imported butter, which, he claimed, should be judged by a local standard. In order to ascertain whether there are any local variations due to breed of cattle, &c., and also to investigate the methods of manufacture, Dr. T. K. Ghose, Assistant Analyst, was deputed to Aligarh, Dinapore, and Ahmedabad, from where nearly all the imported butter in Calcutta is obtained. Dr. Ghose visited four factories in Aligarh, six in Ahmedabad, and four in Dinapore, and collected twenty-three samples for examination. The samples obtained were analysed, and it was found that local variations due to breed, feeding, climate, &c., have no effect on the results, and that the standard as fixed by the Corporation laboratory to judge the quality of butter is not an arbitrary one, but is fair and reasonable.

Mosquito Brigades.

Since the last annual report very important developments have taken place. The following note outlining a scheme for systematic anti-malarial work in definite areas was submitted to the Health Committee:—

As the Committee are aware, a number of mosquito brigades are appointed for a period of about six months every year. They usually work from October to March. They were given a roving commission to clear jungle and to oil collections of water where mosquitoes were breeding. As any attempt to treat all mosquito-breeding grounds with such a limited staff was obviously hopeless, I issued orders that a careful survey of anopheles breeding-grounds was to be made and attention concentrated on these. Even with this limitation the staff was clearly inadequate. An attempt was made to define the really malarial areas by (*a*) noting the number of children with enlarged spleens, and (*b*) locating the anopheles breeding-grounds. A spot map was prepared, and the work of the gangs redistributed accordingly. The results were very encouraging, as there was a decrease in the number of deaths from malaria. The District Health Officer, who took a keen interest in the work and deserves great credit for the good results obtained, is naturally anxious to extend the experiment. With two sub-assistant surgeons in charge of the brigades an attempt might be made to treat all cases of malaria discovered in bustees, the necessary quinine being distributed free of charge. In this way, in addition to reducing the number of carriers, i.e., mosquitoes, the number of sources of infection would also be diminished.

Although the system is by no means perfect, it represents a real advance on the haphazard methods formerly adopted. Where the District Health Officer takes a real interest in the work, the results are satisfactory considering the inadequacy of the staff. Now that this section of the department is made permanent, I hope to see it expand into a complete anti-mosquito organization which will so reduce the prevalence of mosquitoes in all parts of the city as to banish mosquito-borne diseases, render the city immune to yellow fever and make the premier city of India a model of tropical sanitation.

Lady Health Visitors and Midwives.

In the Annual Report for 1915 a detailed account of the successful results obtained by concentrating the work of the midwives in a limited area under the direct control of the health visitor was given, and a recommendation made for the appointment of additional health visitors and midwives. This recommendation was placed before the Health Committee, and I was asked to prepare a detailed scheme of a complete organization for the whole city. With the experience gained several modifications were made, and the scheme placed before the Health Committee.

These proposals were accepted by the Health Committee, and immediate steps were taken to give effect to their resolution as soon as it was confirmed by the Corporation; the existing unit was then re-organized, and a complete new unit started work.

The following extracts from Miss Lewis's report give a vivid impression of the difficulties to be overcome in starting work of this description:—

"The bustee people were afraid, and hid their women if they were pregnant and gave us no information or help. We soon heard of some absurd

rumours afloat, such as (1) the British Raj was in want of soldiers, and one way of getting them was to take all the male babies delivered by the municipal midwives; (2) that before the War could end the King had to offer young children as sacrifice, so the midwives had received orders to let the babies bind to death through the cord." Of the horrors of the lying-in room she writes: "A Mahommedan woman is delivered in the room occupied by her and the rest of the family, which is temporarily vacated. The room is usually very small, and crowded with bits of furniture. The woman is delivered on the floor, on an old and dirty mat, which has been served for the occasion. After delivery, if a bed is available, she is put on it, the doors and windows are closed, and a fire lighted. This is done to keep out evil spirits, and if the idea is to smoke them out, it is done very thoroughly. The wonder to me is how these poor unfortunate women keep as well as they do in such an atmosphere. A Hindu lying-in room differs very little, save that the woman is not allowed to be delivered in the room occupied by the rest of the family. A shed is rigged up, or a corner of a verandah enclosed and she lies on the floor, which is always damp, during the whole of the lying-in, with very little in the way of bedding or clothing. No one attends to her and the baby, because she is considered unclean until mother and child are bathed, which is usually on the sixth day, unless a vow has been made to the God Hari. Later on in the report two examples of Hari puja are given, which are worth quoting:—

"A woman had been delivered at 5 a.m. At 7.30 a.m., when I went to see her, she was under the tap having a bath! This was in December, and the tap was some distance away from the lying-in room. In another instance one of my midwives came to me in great distress complaining that the aseptic umbilical dressing had been removed and a lump of mud applied, the mud being from the God Hari."

In spite of the ignorance and superstition of the mothers, and the insanitary conditions under which the labours were conducted, the results obtained were surprisingly good. In Circle I cases were delivered without a single maternal death—a result of which Miss Banerjee is justifiably proud. In Circle II there were three maternal deaths out of 180 cases delivered, of which one was due to pulmonary embolism (died in hospital), the second due to septicæmia (was treated by untrained midwife before Corporation midwife took up the case, and died on the fifth day). In the third case the cause of death could not be ascertained. The patient had a bath and became unconscious; it was possibly a case of heart failure.

The entire absence of serious complications due to *sepsis* indicates the care and attention paid to the cases.

The effect of skilled attention at births on the infant mortality-rate is strikingly shown by the entire absence of tetanus neonatorum amongst the babies delivered by the municipal midwives and by the extraordinarily low death-rate during the critical first week of life.

Baby Welfare Work.

As I have already noted when dealing with infantile mortality, all attempts to induce mothers to bring their babies for advice and treatment to a "baby clinic," whether at Dufferin Hospital or elsewhere, have failed. The only alternative was obviously to regularly visit all babies brought into the world by our midwives, once a week if possible, and keep them under observation. With forty to fifty new babies arriving every month in each circle, it was necessary to limit the period of observation, to prevent the lady health visitors being overwhelmed with work, and this was arbitrarily fixed at three months. As soon as the puerperal period of ten days during which daily visits were paid by the midwives expired, the babies were entered on the lady health visitor's register, and visited weekly or fortnightly till they were three months old. Only sickly babies were visited weekly, cases which were doing well being visited once or twice a month. This branch of the health visitor's work is quite new, and so far it is very promising. It is obvious, however, that if any appreciable reduction in the infantile mortality is to be expected, this "baby welfare" work must be considerably extended, and provision must be made for supplying the urgent needs of the poor women and children. With regard to the very important question of feeding the mother during lactation, this also is a matter for carefully organized private charity. Each community ought to regard it as a sacred duty to see that every mother is supplied with abundance of good nourishing food while she is suckling her child. A fine milk supply at a reasonable cost is undoubtedly of such vital importance, that when, as in Calcutta, private enterprise fails utterly, it ought to be provided by the municipality. Additional health visitors who will devote their whole time to "baby welfare" work are urgently required. Miss Webb, Superintendent Dufferin Hospital, who takes a great interest in this work, and has been of great assistance in helping our midwives with difficult cases, writes: "My ideal would be to have a member of the Women's Medical Service, here in Calcutta, as head of the maternity and child welfare work."

Vaccination.

The total number of vaccinations performed during the year was 26,687, but allowance must be made for the fact that the department broke all records by vaccinating over 100,000 persons in 1915. The average number of vaccinations performed in a non-epidemic year is about 30,000.

The number of infants vaccinated was equivalent to 74·1 per cent. of the total infant population, calculated by subtracting infantile deaths from registered births. This is by no means satisfactory, and compares very unfavourably with last year's figures, when the number of infants vaccinated was

12,370, actually more than the number of infants surviving.

The number of re-vaccinations performed was 8,727. This is about the average number in a non-epidemic year. The percentage of successful re-vaccinations was 42·4 per cent., an improvement on last year's figure, 39·4 per cent. The large number of cases returned as "result unknown" is due to the number of re-vaccinations performed on ships at the instance of the Port Health Officer.

The system of paying outdoor vaccinators by results was introduced in July, and has been in force ever since. From the statistics, particularly those dealing with primary vaccination of infants, it is clear that the experiment has been an absolute failure.

Report on the Work done in the Corporation Laboratory.

In the Chemical Section, the total number of samples examined during the year under report amounted to 1,987, as follows:

Water, 177; food-stuffs, 1,774; miscellaneous, 36; 1,987.

In the Bacteriological Section, the principal work carried on is in connection with the water supply of Calcutta. The total number of samples examined amounted to 3,062. These were as follows:—

Water, 2,696; milk, 200; pathological and other specimens, including blood, urine, sputum, &c., 166; 3,062.

The total number of samples examined in both sections, 5,049, represents a substantial increase over last year's figure of 3,824.

The filtered water supply of Calcutta maintained its character of a good potable water throughout the year.

During the rains, owing to the turbidity of the river water, it was subjected to a process of clarification at Pulta by the addition of alum cake and slaked lime (alumino-ferric not being obtainable in this country at the time). Although the water was clarified a good deal, faint turbidity was noticeable from the end of July to November. As the chief ingredient in clarifying the water was found to be alum salt, it is desirable that a slight increase in the proportion of alum cake should be used for the purpose. As to the use of slaked lime, this is essential. Alum cake being strongly acid in reaction, it is necessary that the water should be made alkaline previous to the addition of alum cake, otherwise the alumina will not exert its full coagulant action on the fine suspended matter.

The system of continuous settlement of the water both during the dry months and during the rains has been a success, and has enabled the Executive Engineer, Water Works, to supply the necessary quantity of water without much trouble or difficulty.

Tank and Well Waters.—At the request of the District Health Officers to help them in dealing with insanitary tanks and wells, regarding which objections had been raised by the owners, twelve samples of water were examined and found to be quite unfit for use. The tanks and wells were ordered to be filled up by the municipal magistrate, to whom the cases were referred under the Municipal Act.

The total number of samples of milk examined bacteriologically amounted to 200. In none were acid-fast bacilli found.

The total number of food-stuffs examined during the year was 1,774.

The amount of adulteration varied greatly, as the following percentages show:—

Out of 114 samples of adulterated ghee: 35, or 30·7 per cent., showed 10 to 25 per cent. of adulteration; 55, or 42·2 per cent., showed 26 to 50 per cent. of adulteration; 24, or 21 per cent., showed over 50 per cent. of adulteration.

Of 121 samples of ghee extracted from sweetmeats and found adulterated: 46, or 38 per cent., showed 10 to 25 per cent. adulteration; 45, or 37·2 per cent., showed 26 to 50 per cent. adulteration; 30, or 24·8 per cent., showed over 50 per cent. adulteration.

A few were found to consist almost wholly of foreign fat.

Of 150 samples of adulterated milk, 92, or 61·3 per cent., showed from 10 to 25 per cent. adulteration; 53, or 35·5 per cent., showed from 26 to 50 per cent., of adulteration; 5, or 3·4 per cent., showed over 50 per cent. of adulteration.

Slaughter-houses.

The Corporation slaughter-houses, of which there are five, bring in a revenue of eighty to ninety thousand rupees a year, and are by no means a negligible factor in municipal finance. The importance of fully exploiting these institutions for the purpose of revenue is recognized, but unlike other heads of receipts the income from slaughter-houses is for the most part independent of departmental effort and zeal. The receipts are mostly from slaughtering fees which depend on the number of animals killed. The latter, in turn, is regulated by factors not under our control.

The principal matters of interest during the year in connection with slaughter-houses were the opening of the stockyard at Tangra towards the end of the year and the butchers' strike which followed.

The firmness displayed by the Commissioners and the Executive, and the successful measures adopted by the Deputy Chairman to ensure a regular supply of meat, eventually brought the butchers round, and they agreed to comply with the new by-laws, and resumed work from November 19. The strike lasted from November 3 to 18, when it was settled.

Dispensaries.

Kidderpore Dispensary.—This dispensary continues to do good work. The steady increase in attendance during the last two years has been maintained, in spite of a probable decrease of population in Kidderpore owing to shortage of work in the docks, &c.

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An attempt was made to treat leprosy cases according to Heisser's method with Chaulmoogra oil. Altogether eleven cases were treated, of which four gave very satisfactory results. The treatment could be carried out in a much more satisfactory manner if there were facilities for proper bacteriological examination of the cases, and a small clinical laboratory at the dispensary would be a great help.

Ram Chandra Goenka Dispensary and Hospital, Kalighat.

This institution is the benefaction of Rai Bahadur Hariram Goenka and his brothers, who have contributed the entire cost of the building. It is under the control of the Corporation, who have provided the necessary establishment, and bear all the expenses of upkeep. The patients are nearly all of them Hindus. The institution is a great boon to pilgrims, for whose benefit it is primarily intended, but it is also available to the general public. The ratepayers of Calcutta, particularly the people of Kalighat and the neighbourhood, and the large body of pilgrims who go to Kalighat every year cannot be sufficiently grateful to the donors for their generous benefaction.

AMBULANCE SERVICE.

There are at present two motor ambulances in commission. One of them was presented by the St. John Ambulance Association, and commenced working on January 26, 1916. The second ambulance was presented during the course of the year by Messrs. Baldeo Dass, Jugalkishore and Tara Chand Ghanashyamdas, with the reservation that it should be used primarily for wounded and invalided soldiers, and, when not engaged in this work, for accidents, &c. It began working on August 3, 1916. The first ambulance was continuously at work, and travelled 6,483 miles; the time taken in attending to calls and removing patients to hospitals was 850 hours. The second ambulance was out of commission for forty days in all on account of repairs, &c., travelled 1,674 miles, and took 195 hours in attending to calls, &c. The two ambulances responded to 1,329 calls during the year, and 145 calls had unfortunately to be rejected as both the ambulances were engaged at the time.

In addition to two motor ambulances, the Corporation maintained as usual one horse ambulance and six wheeled stretchers at various hospitals for infectious diseases. The question of developing the motor service with a view to the abolition of these antiquated horse and hand ambulances is under consideration.

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MEDICAL REPORT FOR THE YEAR, 1914-15.

By K. S. WISE,

Surgeon General.

GENERAL.

DR. G. S. NEDD resigned the service at the end of November after ten and a half years' duty. Dr. F. E. Field has been seconded from June 18 as medical officer supervising the campaign against hookworm disease carried on by the International Health Commission of the Rockefeller Foundation.

HOSPITALS.

The accommodation of the Georgetown Hospital has been reduced from 533 beds to 400, and that of the Bartica Hospital from 35 to 14 beds. A large part of the buildings at Bartica has been removed for other purposes to the Penal Settlement. The greatest number of persons in the Bartica Hospital on any day was eight.

The number of patients treated has gradually decreased during the last few years, the average for the previous five years being: In-patients 16,402, and out-patients 69,613 per annum.

Phthisis, pneumonia, Bright's disease, enteric fever, and dysentery as usual show the highest mortality.

A separate block in the Georgetown Hospital has been set aside this year for the isolation of infectious diseases, but more especially enteric fever. It is freely used, and the average daily number is about seventeen. Similarly a special ward apart from the main wards at New Amsterdam is reserved for this disease alone. The danger of admitting readily infectious diseases to general wards is well known, and it is hoped ultimately to arrange to exclude all such from the general wards and provide special accommodation.

The percentage of deaths on admission for pneumonia is regrettably high, being for the year at the Georgetown Hospital 60·4. In previous years it has varied between 37·9 and 52·2 per cent. Almost half these patients were brought to the hospital within seventy-two hours of their death, brought at a time when the least movement should be avoided, and at a time when medical aid comes too late.

In the Georgetown Hospital the percentage of deaths to cases treated in the case of enteric fever this year is 36·2.

RETURN OF DISEASES AND DEATHS IN 1915 IN GEORGETOWN, NEW AMSTERDAM, SUDDIE, BARTICA AND NORTH WESTERN DISTRICT HOSPITALS,

British Guiana.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	13	1	13
Anæmia	74	4	78
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	5	1	5
Chicken-pox	6	—	6
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	155	41	155
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	7	2	7
Diabetes Insipidus	1	—	1
Diphtheria	13	2	13
Dysentery	428	102	428
Enteric Fever	136	56	136
Erysipelas	4	—	4
Febricula	3	—	3
Filariasis	—	—	—
Gonorrhœa	104	1	104
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	18	—	18
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	43	1	43
(*b*) Anæsthetic	10	—	10
(*c*) Mixed	—	—	—
Malarial Fever—	—	—	—
(*a*) Intermittent	895	26	895
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	33	—	33
(*c*) Pernicious	15	14	15
(*d*) Malarial Cachexia	4	1	4
Malta Fever	—	—	—
Measles	—	—	—
Mumps	2	—	2
New Growths—	—	—	—
Non-malignant	56	2	56
Malignant	36	11	36
Old Age	—	—	—
Other Diseases	—	—	—
Pellagra	7	5	7
Plague	—	—	—
Pyæmia	7	3	7
Rachitis	—	—	—
Rheumatic Fever	2	—	2
Rheumatism	119	—	119
Rheumatoid Arthritis	—	—	—
Scarlet Fever	1	—	1
Scurvy	—	—	—
Septicæmia	39	34	39
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	9	—	9
(*a*) Primary	25	3	25
(*b*) Secondary	82	1	82
(*c*) Tertiary	143	10	143
(*d*) Congenital	23	5	23
Tetanus	16	11	16
Trypanosoma Fever	—	—	—
Tubercle—	28	20	28
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—

GENERAL DISEASES—*continued.*	Admissions	Deaths	Total Cases Treated
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	3	—	3
Yaws	39	—	39
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	678	27	678
Circulatory System	144	40	144
(*a*) Valvular Disease of Heart	—	—	—
(*b*) Other Diseases	—	—	—
Digestive System—	—	—	—
(*a*) Diarrhœa	198	32	198
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	33	2	33
Congestion of Liver	1	—	1
(*d*) Abscess of Liver	19	12	19
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	9	—	9
(*g*) Cirrhosis of Liver	—	—	—
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	873	111	873
Ear	20	—	20
Eye	235	—	235
Generative System—	—	—	—
Male Organs	339	5	339
Female Organs	1,901	77	1,901
Lymphatic System	123	2	123
Mental Diseases	158	2	158
Nervous System	226	54	226
Nose	12	—	12
Organs of Locomotion	171	5	171
Respiratory System	1,264	404	1,264
Skin—			
(*a*) Scabies	20	—	20
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	12	—	12
(*f*) Other Diseases	564	7	564
Urinary System	687	177	687
Injuries, General, Local—	—	—	—
(*a*) Sirisasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	3	—	3
(*c*) Other Injuries	534	20	534
Parasites—	8	—	8
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	322	28	322
Filaria medinensis (Guinea-worm)	321	30	321
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	3	—	3
Corrosive Acids	1	—	1
Metallic Poisons	4	—	4
Vegetable Alkaloids	7	2	7
Nature Unknown	—	—	—
Other Poisons	9	3	9
Surgical Operations—	—	—	—
Amputations, Major	1,771	70	1,771
,, Minor	2,328	—	2,328
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	—	—	—

The nursing staff is reduced by the departure of Miss Fleming in January, and Miss Crow was appointed Nurse-Superintendent at New Amsterdam Hospital in her place.

At present there is only residential accommodation for eighteen probationer nurses at the Public Hospital, Georgetown. It is highly desirable that all the nursing staff of the institutions should be resident. The few vacancies at the Probationers' Home are always readily filled. The nurse-superintendent records: "I constantly receive applications asking to be allowed to live in even from the assistant nurses, thus proving how much they appreciate the comfort the home affords and realize the benefit it is to themselves."

In this connection it is to be remarked that for several years 50 to 75 per cent. of all fines in the Public Hospital, Georgetown, have been inflicted for frequent and repeated late-coming.

Both Georgetown and New Amsterdam have training schools attached, and since 1906 eighty-seven nurses have attended the three years' training, passed the examinations, and received certificates as nurses. Of these thirty-two are now on the staff at Georgetown, two at New Amsterdam, and one at Bartica. Several others are employed in the Estates' Hospital. One hundred and thirty-eight have attended the course and passed the qualifying examination as nurse-midwives since 1906.

The Georgetown and New Amsterdam Hospitals are supplied with maternity wards, and it is very regrettable that the plan for adding such a ward to the Suddie Hospital had to be postponed. There were 605 deliveries at Georgetown and 129 at New Amsterdam. Deliveries take place in the other hospitals, though there is no special ward therefor.

There is an outdoor Midwifery Department at Georgetown, consisting of four midwives, who attend in the city. Their services are much appreciated and utilized, 153 deliveries having taken place under their care.

All the hospitals save Morawhanna and Arakaka have been frequently visited. They were always clean and tidy, the buildings well kept and the grounds in order, invariably a credit to those in charge.

Asylums.

I visited the lunatic asylum on five occasions, and always found it in excellent order. The buildings are well kept, the grounds trim and neat, the patients clean and well attended. Escapes are few, manual restraint not required, mechanical restraint rare, and seclusion under lock and key necessary on only two occasions, both for extreme violence, and both in the case of criminal lunatics.

The average number of inmates has increased by forty-six for this year, rising from 724 to 770. For this year the death-rate is 8·4 per cent., which is very satisfactory for an institution of this character.

Leper Asylum.

The average numbers during the past few years have shown a tendency to decrease. The accommodation of the male side was ample, and a special cottage is set apart for those admitted who the Medical Superintendent considers may turn out not to be suffering from this disease.

The accommodation of the female side has at times been somewhat strained.

Absconding still occurs, as the record shows nineteen for the year. Of these nineteen one returned voluntarily, eleven were recaptured by the police, two by the attendants, and five are still at large.

Religious services, school attendance, concerts, and sports, &c., have been carried on as usual. It has been possible, however, this year to occupy the inmates in industrial work, such as repairing the cottages, painting them, the enlarging and concreting of the tailor and shoemaker workshops, the enlargement and rearrangement of the store.

The farm has given very poor yield, probably due to prolonged cultivation and continuous growth of the same products.

The general conduct and demeanour of the inmates is reported as being again maintained at a good standard.

The mortality during the past two years has been low for a leper asylum. 74 per cent. of the deaths are directly due to leprosy, while 26 per cent. are attributable to other causes, e.g., heart disease, pneumonia, &c.

In-patients at the hospital amounted to 263 and the out-patients to 679. There was one child born and sent at once to the Orphan Asylum. Thirty-four minor operations were necessary.

During the year fifty-two males and thirty-one females were discharged, against forty-four males and nine females last year (forty of these went by return ship to India). This increase is due to the release of seventy-two of the older inmates who had been under careful and continued observation for periods varying from three to thirty years, and in whom no doubt remained that the disease had finally and completely disappeared.

Nine inmates who had been under observation for less than three years, and who also show no signs of active disease, have been allowed out under conditional discharge subject to regular inspection by the Government medical officer of the district, as provided for by Ordinance.

Public Dispensaries.

Georgetown.

There are two dispensaries, No. 1 at Broad Street Police Station, and No. 2 at the Public Hospital.

There are five country dispensaries, situated as follows: (1) Demerara River; (2) Berbice River; (3) Upper Pomeroon; (4) Lower Pomeroon; (5) Moruca River.

The dispensers in charge are provided with boats for the purpose of paying periodical visits to the different grants, homesteads, and missions.

The following shows the number of persons treated:—

Paying patients, 5,130; police patients, 45; paupers, 16,922; total, 22,097.

Prison Hospitals.

At H.M. Penal Settlement there has been a great reduction of those admitted to hospital (104 against 489), and in the daily average in hospital (3 against 13). The most striking reduction is in the number of cases of malarial fever (12 against 124) and in the diseases of the alimentary system (12 against 152).

The prophylactic use of quinine has been strictly carried out. The farm and piggery have been removed to a considerable distance, thus diminishing to a minimum the number of flies which for years had been a plague. The kitchen and storeroom have also been screened.

All the prisoners were also examined for hookworm infection and treated by thymol.

These improved results in the prisoners' health have been successful, in spite of an increased average number, and in spite of extensive blasting and quarrying in the construction of a dry dock.

The Onderneeming Industrial School for Boys.

The average daily number of boys was 111·9; the percentage of sick to this daily average was 0·62. The prophylactic use of quinine has produced a marked improvement in the incidence of malarial fever. Of the forty-two cases, thirty-five were very mild. Only seven were treated in hospital. All the boys have been examined for hookworm infection, and the forty-three so discovered were treated. On February 20 chicken-pox broke out, and up to March 31 four cases had developed in all.

Alms House and Orphan Asylum.

Alms House.

The average number of inmates was 735. The total number treated was 2,357. The death-rate was 18 per cent. Persistent efforts are still directed against the prevalence of flies in this institution, and much reduction has been effected. In consequence the incidence of diarrhœa has been lowered from 165 cases to 60, of dysentery from 32 cases to 12.

During the year all inmates have been examined for hookworm infection and those infected treated by thymol. The results are as follows: 1,914 admissions examined, 1,564 found infected, and 1,091 treated till microscopical examination failed to find infection. The remainder of those infected either died or left during the course of treatment.

Orphan Asylum.

The daily average in this institution is eighty-four, viz., boys fifty-seven and girls twenty-seven.

It is regrettable to report that filarial infection is very frequent in these children, and no improvement is noticeable in three years. Examination in 1911 show 45·7 per cent. infected, and examination (many of these same children) in 1914 showed 45·4 per cent. infected.

All the orphans were examined for hookworm infection, and sixty out of eighty-seven were found infected. These sixty have been treated.

General Health.

The general health of the colony during this year has still continued the improvement noticeable during the past two years.

The total population has increased by nearly 6,000 persons, and stands at 309,938. The birth-rate was 33·1 in 1912; 34·6 in 1913; and 34·4 in 1914. The death-rate was 29·2 in 1912; 24·2 in 1913; and 24·5 in 1914. These figures represent very clearly the great change for the better which has swept over the whole colony.

The mortality of infants, always an important indication of a country's medical influence, also slowly improves, standing at 229 deaths per 1,900 births in 1911, at 190 in 1912, at 179 in 1913, and at 170 in 1914. This figure is greatly in excess of what should be natural in such favourable and equable climatic conditions.

Recent trial borings have shown that artesian water of good quality and quantity is to be found at 600 to 700 ft. over most of the coast lands. This success has solved one of the formidable sanitary difficulties of British Guiana, and should ultimately reduce the very high diarrhœal rate.

There has been a general increase of deaths from bowel complaints, otherwise the deaths from the principal causes remain the same or are reduced in number.

Urban Districts.

The city of Georgetown has participated in the improved health of the colony. The birth-rate was 30·8 per 1,000 persons living, against 30·6 in 1913. The death-rate was 28·3 per 1,000 persons living, against 26·5 for 1913.

The rate of infantile mortality remains a serious feature of the Health Officers' annual report, being 210 deaths under one year for every 1,000 births, against 235 in 1913. The four district midwives of the Public Hospital do much excellent work amongst the poor. Four health visitors are now carrying out the important work of visiting newly-born infants in their homes up to the age of twelve months. Two clinics for mothers are carried on each twice weekly in the city.

The city still lacks an adequate potable pipe water supply. The discovery of abundant artesian water of good quality under Georgetown now renders it possible to place this city in the same favourable position as others elsewhere.

The town of New Amsterdam records a rise in the birth-rate from 29·9 for 1913 to 34·5 for 1914, with a fall in the death-rate from 25·0 in 1913 to 21·1 in 1914.

Infantile mortality has been actively combated by the local branch of the Baby-Saving League. Health visiting has been instituted, and a special registered nurse-midwife supplied with a clinic for mothers at the Public Hospital. The rate in 1913 was 142, and in 1914 has dropped to 119.

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Artesian water has also been found in good quality and quantity by a trial boring beneath this town.

Village Areas.

The villages in general and some of the country districts are well drained, but in many country districts and rural sanitary areas drainage is conspicuous by its absence, and rain is followed by swamping. Lack of yard drains, presence of low bush and unnecessary vegetation, leading to dark and moist surroundings, irregular mosquito-breeding pools, unscreened barrels, and absence of privy accommodation represent some of the removable evils.

The usual water supply is of bad quality, and in many cases lacking in quantity. Ponds or trenches fed by rain or by peaty water led through canals for many miles open to frequent surface contamination form often the sole supply.

Artesian wells have been successfully sunk at Lichfield, Nabaclis, and Plaisance. This water has a small percentage of iron which readily oxidizes out, and deposits either as a sediment or as a pellicle. Dr. von Winckler reports that the water at Nabaclis is freely used for all purposes by the neighbouring villages.

All the medical officers condemn the present supplies, and strongly urge that wells be sunk and artesian water be made available. It is a matter of experience that the provision of a pure water supply not only reduces to a minimum water-borne diseases, but also diminishes the incidence of other diseases in general.

The diseases most common were: malaria, pneumonia, bronchitis, influenza, ankylostomiasis, and intestinal disorders. That most fatal to the adult was pneumonia, and to the children malaria, bronchitis, intestinal disorders, and marasmus.

Dysentery, whooping-cough, and yaws is specially recorded in three districts.

In several districts malaria is recorded as less frequent and fatal. In the Canje-Highbury District the villagers use more quinine for preventive purposes, and beneficial effect following the introduction of Government quinine is reported.

In two villages the International Health Commission carried out work with the object of ameliorating or eradicating the prevalence and effects of hookworm disease. An effort was made to examine every single person and treat those infected to a final issue. At the same time an active sanitary campaign was instituted in these areas by the Public Health Department.

The Baby-Saving League has also formed branches in these two medical districts, and has established five clinics for mothers and four registered nurse-midwives with a system of health visiting.

The Suddie and Anna Regina Districts are markedly unhealthy compared with elsewhere, and the medical officers comment specially on the choked drainage, and refer to the line of courida on the foreshore preventing the entry of sea breeze to the villages. These districts are, in addition, covered with bush and overgrown with trees. Dr. Castor writes: "The result of these circumstances is that, though these conditions may not engender disease, yet they must reduce the resisting power of those living under them. Whilst visiting some of the villages I have experienced that dank feeling that is felt in the forests of West Africa."

"The health problem of the villages" (says Dr. Douglas) "is intimately bound up with the industrial condition of the people, and I am of opinion that little progress will be made until village industries are organized requiring (and getting) steady, constant, and reliable labour."

Sugar Estates.

The sugar estates present a great contrast in sanitary conditions as compared with the villages. Well-drained yards with absence of mosquito-breeding places, removal of bush, and the universal provision of latrines are everywhere found. The prevalent diseases and mortality are much the same as in the villages.

On the Buxton and Peter's Hall estates a severe epidemic of influenza occurred in the last four months of the financial year. It affected children in particular, and in the case of the Diamond estates increased the death-rate, no less than 51 per cent. of all the deaths occurring in these months.

Dysentery occurred at Port Mourant and Albion, and was associated with the presence of a scum on the water supplies containing amœbæ. With some difficulty this was removed, and prevented the occurrence of further cases of this disease. The same scum is found in the Canje Creek, from which the water is drawn.

Special attention has been directed to the amelioration of hookworm infection, and on many estates every person has been examined and treated. Where the infection previously was found to be 60 to 80 per cent., it has now been reduced to 20 per cent. and lower. The cases of intense infection with acute symptoms not uncommon years ago are now rarely if ever seen. Thymol and beta-naphthol are the drugs most used. In the Canje-Highbury estates Dr. Barnes records good results from the use of infusion of quassia. These results are not confirmed elsewhere.

On the Diamond estates excellent results have been obtained from the use of preparations of the plant *Chenopodium ambrosioides* var. *Anthelminticum*. The oil of Chenopodium is used with castor oil, the leaves and stems as an infusion. In suitable doses used daily the oil is recorded as removing all the nematode worms in from one to three weeks (even the whip worm finally disappears), while the infusion produces similar results, requiring, however a longer time—one to two months. This plant grows wild in many parts of the colony, and its uses are well known to black and Portuguese residents in the villages.

The estates were as a whole very healthy. On

and he had 0·4 grm. that afternoon. He stood the injection quite well, and went home that evening. The second injection, 0·6 grm., was given on January 3, 1918. The eruption was gone, and the glands were very much smaller, being difficult to palpate. There had been no more fever, and the patient expressed himself as feeling much fitter. Bearing in mind the experience of Hata with relapses after one small dose, we thought it better to give a third and final injection on January 25 (0·9 grm.). This produced chilliness and a slight rigor. A careful examination on that day did not reveal any more signs of the disease, the glands could not be felt, there was no trace of any eruption, no rise of temperature, and all the pain in the neck, together with the headache, had completely disappeared. On January 28 he expressed himself as feeling all right, with the exception of getting fairly easily tired and slight pain in his legs. In view of his malarial element, he was told to take 5 gr. of quinine twice a day for the next three months.

A CASE OF RAT-BITE FEVER.[1]

By S. R. Douglas,
L. Colebrook,
and
A. B. Fleming, M.B.
Inoculation Department, St. Mary's Hospital.

A farmer, aged 36, had his right hand bitten by a rat about four months before his admission into St. Mary's Hospital. The small wound rapidly healed without any signs of inflammation.

Between five and eight weeks afterwards a tender red swelling appeared on the anterior surface of the right forearm, which subsided without treatment. At about the same time the patient commenced to feel ill and consulted a medical man, complaining of pain in the right side of his chest, and, intermittently, of a feeling of "severe stiffness" extending from the right shoulder to the top of the forehead. A cough developed about this time and persisted for several weeks.

In the middle of December, 1916—i.e., about three and a half months after he had been bitten—he was admitted to the Maitland Sanatorium. No sign of tuberculosis could be made out. He was transferred to St. Mary's Hospital.

On admission his general condition was fairly good. Physical examination failed to reveal any abnormality. Enlarged lymphatic glands were, however, found in both axillæ, more especially on the right side. These glands were soft, freely movable, and varied considerably in size from time to time, the enlargement being most noticeable during and immediately after a febrile attack. The glands in both groins were also enlarged, but no enlargement of the cervical glands could be made out.

[1] Abstracted from *Lancet*, February 16, 1918.

The febrile attacks occurred at intervals of three or four days when the patient was confined to bed, but even in the intervals an attack could almost certainly be induced by the patient taking a certain amount of muscular exercise.

The attack usually commenced with subjective feelings, so that the patient was usually able to foretell an attack the day previous to the actual rise of temperature. The commencement of the fever was rather sudden, but rigors were absent, the degree of fever varied considerably, during some attacks reaching 104° F., but more often being between 101° and 102° F. The fall of the temperature was usually more gradual than the onset.

During the attack the patient complained of a feeling of lassitude and some disturbance of the digestive system, such as nausea or flatulence. Pain in the limbs was usual, and on one occasion a dusky, bluish-red, macular rash spread over the right shoulder and pectoral region. The pulse and respiratory rates were slightly increased. No signs of inflammation of the scar of the rat-bite or of the lymphatics leading from it were ever detected. The lymphatic glands of both axillæ and groins became more markedly enlarged during and immediately following these attacks.

Bacteriological and other Pathological Investigations.

Blood films were examined, both stained and unstained, on several occasions during the febrile attacks, and also in the intervals between them. Examination of such films stained with Leishman's stain showed a considerable leucocytosis of the polymorphonuclear type during the febrile attack, but neither intra-corpuscular parasites nor spirochætes were ever found. The unstained specimens were examined by dark-ground illumination in order to demonstrate the presence of spirochætes, but the results were uniformly negative.

At the height of three separate febrile attacks 10 c.c. of blood were distributed partly into tubes of simple broth and partly into tubes of broth containing trypsin. Half of these tubes were then incubated aerobically and half of them anaerobically. To ascertain the presence of growths these cultures were examined both by the preparation of films and also by subculture, but with the exception of one tube, which had evidently been accidentally contaminated, all the tubes remained sterile, although they were incubated for at least ten days.

The urine was bacteriologically negative. The fæces contained no abnormal bacteria.

On opening the right axilla the glandular enlargement was considerably more marked than had been suspected from palpation, the axilla being occupied by a mass of enlarged soft lymphatic glands bound together by periadenitis and varying in size from a pea to a large nut. Two or three of these glands having been dissected out of the mass the wound was closed by suture. The glands thus obtained were soft, white in colour, and on section showed

neither areas of congestion nor of caseation. Dr. B. H. Spilsbury reported that sections showed cellular changes indicating a chronic inflammatory condition. The most noticeable feature was the proliferation of the endothelium, which was so marked that in the medullary portion of the gland the ordinary lymphoid tissue was in places almost entirely replaced by masses of endothelial cells; in the secondary follicles small foci composed of four or five endothelial cells were seen scattered amongst the lymphoid cells. There was also a marked increase in the number of the polymorphonuclear leucocytes. No bacteria or protozoa could be demonstrated.

BACTERIOLOGICAL INVESTIGATIONS OF GLANDS.

From the remainder of the glands the following bacteriological investigations were made: (1) Cultures were made on various media; (2) two mice were inoculated with a considerable quantity of a thick emulsion of the gland tissue in broth.

SOLID MEDIA.

Media employed	(1) Incubated under aerobic conditions	(2) Incubated under anaerobic conditions
Dorset's egg	No growth	... No growth
Blood agar	,,	... ,,
Serum agar plate ...	One colony of diphtheroid bacillus	... —
Coagulated serum ...	One colony of staphylococcus	... —
Agar stab	No surface growth	... One colony on streptococcus if depth of stab

LIQUID MEDIA.

Ordinary broth	... Staphylococcus	...	—
Broth + trypsin	... No growth	...	—
Hydrocele fluid	... Diphtheroid bacilli	...	Streptococcus
Broth + asbestos	... —	...	,,

(1) The results of the various cultures are given in the above table, from which it will be seen that of the five cultures incubated under anaerobic conditions two remained sterile, while the other three showed a growth of streptococcus; in the case of the cultures incubated under aerobic conditions two gave a growth of staphylococcus and two a growth of a diphtheroid bacillus, both of which micro-organisms were most probably contaminations, since both types are constantly found on the skin of the axilla.

(2) The details and results following the inoculation of the gland tissue into mice were as follows:—

Mouse 1 was inoculated intraperitoneally with about 1·5 c.c. of an emulsion of the gland tissue in broth. Four days after the inoculation, and again two or three weeks later, the blood was examined for the presence of spirochætes—with negative results. This animal survived.

Mouse 2 was inoculated subcutaneously with about 2 c.c. of the same emulsion of gland tissue. On the fourth day after the inoculation the animal was obviously very ill, and on the fifth day it died. Examinations of the blood for spirochætes, on the day preceding and also after death, were quite negative.

Post-mortem examination showed that the site of inoculation and neighbouring lymphatic glands were congested. Heart, lungs, liver, and kidneys appeared normal. Extensive plastic peritonitis was, however, present, the whole abdominal contents being matted together by soft adhesions, the meshes of which were filled with turbid fluid. The spleen was much enlarged and congested.

Films made from the peritoneal fluid showed vast numbers of streptococci, whilst those made from the heart's blood showed a few short chains and diplococci.

Cultures made from the heart's blood, peritoneal fluid, and spleen all gave pure cultures of a streptococcus.

A *third mouse* was inoculated subcutaneously with 0·1 c.c. of the heart's blood of mouse No. 2. This produced no obvious symptoms for a long period, but death occurred somewhat suddenly twenty-one days after the inoculation.

Post-mortem examination again showed plastic peritonitis, and cultures taken from the heart's blood, peritoneal fluid, and spleen gave pure cultures of a streptococcus. Films made from the peritoneal fluid showed enormous numbers of streptococci.

CHARACTERISTICS OF STREPTOCOCCI ISOLATED.

The streptococci isolated from anaerobic cultures and those isolated from mice which succumbed to inoculation proved to have the following characters:—

Morphology.—Long chains of round cocci with a few ordinary involution forms. Gram's stain was retained.

Cultures.—On *agar slopes*, when first isolated, growth could only be obtained under anaerobic conditions, but after subculturing good growths were obtained under aerobic conditions; the colonies were small, round, showing but little tendency to coalesce. *Broth cultures* give a thick granular deposit, leaving the upper portions of the media clear.

Action on various sugar media, &c.—Acid was produced in broths containing lactose, saccharose, and salicin, while those containing raffinose and mannite were unaffected.

These characters taken together indicated the streptococci isolated to be a strain of *Streptococcus pyogenes*, and this conclusion was further confirmed by the fact that emulsions of this coccus were agglutinated to its full titre by a serum prepared by inoculating a rabbit with a typical *Streptococcus pyogenes* isolated from a suppurating wound.

The patient's blood agglutinated this streptococcus completely when diluted 1 in 80, and partially in a dilution of 1 in 160; a control normal serum gave no agglutination in 1 in 10 dilution.

PROGRESS AND TREATMENT OF THE CASE.

At the time the glands were removed the patient had been in St. Mary's Hospital seven weeks, and

Special attention has been devoted to the villages on the east and west banks of the Demerara River. The measures enforced are in general the clearing of interlot drains, adjusting the level of the lots, weeding off low bush, whitewashing and banking privies, screening of vats and barrels, and the removal of grosser sanitary nuisances.

QUARANTINE.

During the year quarantine was enforced for:—

(*a*) Plague against Venezuela and Brazil.

(*b*) Yellow fever against Cayenne, Venezuela, and Brazil.

(*c*) Small-pox against Grenada, Nevis, and Guadeloupe.

The quarantine regulations have been duly enforced, and no case of infection has occurred within the colony. One case of small-pox was removed from an incoming ship and treated in the quarantine station. Forty ships were visited by the health officer and seven fumigated by the Clayton machine. The quarantine station has been inspected every three months and is kept in good order. The various disinfecting machines are regularly steamed and tried.

VACCINATION.

Special landinated lymph from the Lister Institute, England, is now used instead of glycerinated lymph, and is found more successful.

The number of successful vaccinations during 1914-15 were 2,672.

BACTERIOLOGICAL DEPARTMENT.

In this year a definite separation has been made between the Public Health Department and the Bacteriological Department. Previously there were two bacteriologists who were also Government medical officers of health, and the work of both departments was done in one office. Now there is but one bacteriologist and one medical officer of health, and the work is done in two entirely separate buildings.

The work of this department as usual shows a large number of examinations for tubercle bacillus, for the diagnosis of enteric fever and filarial infection. Many water samples, milk, and sewage effluent have been examined for the Public Health Department.

Special attention has been paid to the cause of deaths under one year of age, and of the ninety-three such deaths pneumonia accounted for twenty-five, enteritis for twenty, malnutrition for ten, and syphilis for eight.

PUBLIC LUNATIC ASYLUM, BERBICE.

The sanitary arrangements and drainage remain the same as in past years; the drainage is good.

Water Supply and Dietary.—The rain water in the vats and tanks attached to the buildings and the creek water from the water works have proved sufficient for the actual needs of this institution.

The dietary of the attendants and patients was good and plentiful during the year, but the expenditure under this head was considerably increased in the latter half of the financial year owing to the all-round increase in the price of imported foodstuffs, chiefly flour, and to the diminished output of ground provisions from the Prison Farm; added to these the increase in the number of inmates during the year—an increase of twenty-two admissions over the previous year—continued to give cause for serious concern.

Precautions against Fire.—Regular monthly fire drills were held during the year. The mains were tested and pressure obtained from the water works by the Fire Brigade from New Amsterdam; a pressure of 57 lb. was obtained in four minutes from the time of the call.

In order to increase the efficiency of the precautions against fire, His Excellency the Governor appointed a committee to consider and report on the best means of spending the grant of $6,000 made by the Combined Court for the purpose; the committee met on July 15, 1914, but owing to the outbreak of the War the scheme proposed was not proceeded with; there is no doubt that the carrying out of this would have rendered this institution entirely independent of water, which has to be pumped and brought a distance of several miles through pipes which are liable to break, specially those in this institution, which are old and unable to stand high pressure.

The prophylactic administration of quinine gr. 15 weekly to every attendant and inmate was begun on July 12, 1914, and continued for two months with marked effect in the health of the staff and patients.

The chief diseases treated were chronic Bright's disease, senile decay, pulmonary tuberculosis, and pneumonia.

The number of cases of pellagra admitted during the year shows an increase of six over the previous year; of these, seven were females; this bears out the increased prevalence of the disease in females, which has been found to occur in the Southern States of America in the pellagra zones.

Q. B. DE FREITAS, G.M.O.,
Medical Superintendent.

Colonial Medical Reports.—No. 85.—Bengal.

TRIENNIAL REPORT ON HOSPITALS AND DISPENSARIES UNDER THE GOVERNMENT OF BENGAL, FOR THE YEARS 1914, 1915 and 1916.

By W. R. EDWARDS, C.B., C.M.G., M.D., I.M.S.,

Surgeon General.

This report must of necessity be a somewhat barren one, coinciding as it does almost entirely with the period of the war; the result has necessarily been that money for improvements has not been forthcoming, and that we have to a great extent been deprived of our personnel.

However, thanks to the devotion of those senior officers who have been left, and to the way in which the members of the Bengal Medical Services, other than the Indian Medical Service, have responded to the calls made on them, the work of the Department has been carried on with very little friction and not unsuccessfully.

It was in 1914 that the title of the Head of this Department was changed to that of Surgeon-General with the Government of Bengal, a title which carries with it the rank of Major-General. At the same time permission was given for the Surgeon-General to recruit his Personal Assistant from the Indian Medical Service. This permission, owing to the war, has not been taken advantage of.

As soon as war was declared a call was made on the Medical Services. The result has been that the work of the I.M.S. Officers in Bengal has for some time past been to a great extent carried on by Civil Assistant Surgeons: in the mufassal, this has been especially the case.

Although a certain number of Sub-Assistant Surgeons preferred dismissal from the service to military duty, Bengal has not done badly.

The scheme for the training for Indian nurses was introduced by Lady Carmichael and is known by her name. Her idea was to eventually introduce trained Indian nurses into all mufassal hospitals. Of course there is no doubt that the introduction of trained female nurses into hospitals, where there has been no trained nursing, is a great advantage, and it works well in hospitals where quarters can be found for the nurses, and where they are kept under adequate surveillance. The training is for three years. They are trained in elementary anatomy, physiology, midwifery, minor surgery and general nursing. The classes are conducted by the Nursing Superintendent, the Resident Surgeon, and the additional Assistant Surgeon. The nurses are housed in quarters in the hospital compound.

The scheme is a good one and will, I hope, prosper. The nurses when trained are not bound to serve in Government hospitals, but some of them are now working as trained nurses in the Sambhu Nath Pandit Hospital, and we hope before long to get them in the Dacca Hospital. After that we shall endeavour to provide for them in the larger mufassal hospitals.

The hill girls are not as a rule willing to work in the plains, they gladly take private nursing work, and the demand is greater than the supply.

Registration of Nurses.—This is a step which has been strongly advocated by Lieut.-Colonel J. T. Calvert, I.M.S., Principal of the Medical College, and it is about to be considered by the Governing Body of the Bengal Medical Council. A large number of nurses are trained at the Medical College Hospitals and the Presidency General Hospital. Formerly a certificate of training was given after a three-year course. In 1911 a new scheme was introduced; not only was the training greatly improved, but examinations were insisted on, and only those nurses who passed were granted a diploma.

There is, however, no system of registration for nurses and one is urgently required. One cannot at present or for a long time to come prohibit unregistered nurses from practising, but when a system of registration is in force, the public will soon come to understand that all properly trained nurses are registered, and, when possible, will insist on having them. This will undoubtedly give the qualified nurses a better standing, and will benefit them as well as the public. It will also make the nurses value their diplomas more highly. Nurses who behave in an unprofessional manner may have their names removed from the register, and this again, I think, will help to raise the standard of nursing and be a protection to the public.

Indian Medical Degrees Act.—This Act marks a very great advance in medical education in India; it was passed by the Indian Legislative Council on March 16, 1916. Before that date anyone was at

been prepared and printed and was being favourably considered by the authorities in August, 1917. It may be cited in full as an example of the general sort of health organization which met with approval during the days of reconstruction under the Kerensky government. It will be noted that it calls for a high degree of decentralization as is essential to meet the demands of the Revolution, while at the same time providing a strong central staff of advisory experts.

Vital Statistics of Russia.

Russia has not had a general census since the year 1897, and there is no general system of registration of births and deaths other than the church records, which are reasonably complete, and are carefully kept and analysed by the central statistical committee of the Ministry of the Interior. The Russian has a gift for statistics, and statistical bureaus are well organized and directed by very competent experts, so that such figures as are available are reasonably reliable.

The central statistical committee published last year a volume on "Statistics of the Russian Empire: Movement of Population of European Russia for the Year 1910," some of the data from which may be worth citation and analysis. The estimated population of European Russia for that year was 118,700,000. The calculated marriage rate was 8·2 per 1,000, the birth-rate 44, and the death-rate 30·8. The birth-rate by religions varied from 47·1 among the Orthodox and Mahometans to 22·3 among the Protestants and 21·7 among the Hebrews. The death-rate varied from 33·4 among the Orthodox and 27·5 among the Mahometans to 15·9 among the Protestants and 12·4 among the Hebrews. The Orthodox in European Russia make up 83 per cent. of the total population, and each of the other four religions between 3 and 6 per cent.

Thirty-eight per cent. of all deaths were under 1 year of age, and 21 per cent. between 1 and 5 years.

The mortality rate in European Russia has decreased quite steadily from 37·2 in 1867—1871 to the figure of 30·8 cited above for 1910.

The Problem of Infant Mortality.

There is one public health problem which is everywhere of such importance as to deserve special consideration, and which in Russia possesses a peculiarly dominant importance, the problem of the protection of the infant during its first year of life.

This question has received serious consideration from Russian sanitarians and statisticians ever since the Russian Economic Society at its meeting in Petrograd in 1835 called special attention to the great mortality of infants among the peasants. In the report on infant mortality in Russia, prepared for the 1906 International Congress of Charities at Milan, the high infant mortality rate of Russia was emphasized very forcibly, and was attributed chiefly to the fact that the agricultural labour of women, particularly among the Great Russians, interferes with the breast-feeding and maternal care which are essential if a fair proportion of the infants born into the world are to survive.

A study of the "Statistics as to Movement of Population in 1910," published by the Central Statistical Committee, indicates that in that year deaths under 1 year made up 38 per cent. of the deaths at all ages. The infant mortality rate (deaths under 1 year per 1,000 births) was 266 for European Russia, while at the same period the rates for certain other countries were: Austria-Hungary, 207; Germany, 192; Italy, 142; England and Wales, 130; France, 111; Denmark, 106; Sweden, 75; Norway, 67; and New Zealand, 56.

The rates by Provinces in 1910 varied from 370 to 134, the higher rates obtaining generally in the north and east, and the low rates almost universally in the west. This distribution for 1910 corresponds fairly well to that reported for 1895-1899, and it seems clear that the lower rates in the west are due to the better care given to the children of the Finns and Letts of the Baltic Provinces, and the Lithuanians, Poles, Jews, and Germans of the west as compared with the Great Russian peasants of the central and eastern Provinces. By religions the infant mortality rates are: Hebrews, 128; Catholics, 150; Mahometans, 163; Protestants, 179; Orthodox, 285.

The infant mortality rate of the city of Petrograd was as high as 330·8 in 1882; since 1886 it has varied by years between 218·8 and 277·7, and by five-year periods from 238·3 (1891-1895) to 256·3 (1906-1910). The 1915 figure was 251, so that there has been no appreciable decrease in these enormous rates for a quarter of a century.

Twenty-five per cent. of the infant deaths occur during the first month, and 18 per cent. during the first week. The second and third months of life account for 16 per cent. of the total, the fourth to the sixth month for 24 per cent., the seventh to the ninth month for 19 per cent., and the tenth to the twelfth month for 15 per cent. Seasonal differences are not as striking as might be expected, 25 per cent. of infant deaths occurring during the winter, 28 per cent. during the spring, 28 per cent. during the summer, and 18 per cent. during the autumn months.

Of all the infant deaths in Petrograd 32·1 per cent. were due to digestive diseases, 21·7 per cent. to congenital debility, 20·5 per cent. to pneumonia, 5·4 per cent. to acute contagia (measles, diphtheria, scarlet fever), 2·6 per cent. to tuberculosis, and 17·6 per cent. to other causes.

The enormous infant mortality rate of Russia is, of course, due as everywhere, to Dr. Emmet Holt's twin factors, "Poverty and Ignorance," in an accentuated form. There is a close relation between the variation in infant welfare rates and illiteracy by races, 70 per cent. of men and 91 per cent. of women being illiterate among the true Russians, as against 40 per cent. of men and 41 per cent. of women among the Germans, 48 per cent. of men

and 47 per cent. of women among the Letts and Lithuanians, and 51 per cent. of men and 72 per cent. of women among the Hebrews. In particular it is ignorance in regard to the principles of infant feeding which contributes most conspicuously to the unfortunate results observed. The Russian mother is apt to continue to give breast milk to her infant for a considerable period; but unfortunately she gives the child other and less innocuous foods from a very early age. Thus of a group of mothers in Saratov Province only 10 per cent. were found to be bringing up their babies on breast milk only, while in another district only 1·4 per cent. nursed their babies without the addition of other food up to the seventh or eighth month. Of 2,000 women canvassed by one investigator in the Province of Orel, 49 per cent. had begun artificial feeding by the end of the first month.

The remedy for all this is, of course, clear and obvious—the establishment of infant welfare stations for the instruction of mothers in the duties of maternity, and such an improvement in their economic condition as may enable them properly to fulfil those duties.

An admirable beginning has been made along these lines, as has been suggested in discussing the work of public health administration in Petrograd and Moscow. The first goutte de lait was established at Petrograd in 1901, and the more important educational work of the baby clinic was begun about ten years ago. A most important factor in the development of this work has been the stations in various parts of the country, with main offices and an admirable monthly journal at Petrograd. There is a most excellent Infant Welfare Museum in Petrograd with a remarkable series of anatomical models, charts and pictures, and a good library; and a fund of 1,000,000 roubles contributed by the banks of Petrograd and Moscow on the occasion of the Romanov Tercentenary was set aside before the War to be devoted to the erection of buildings for the work of this society.

The splendidly equipped infant welfare station at the Morosov Hospital in Moscow has been mentioned above. The work done here and at the other welfare stations in Petrograd and Moscow, and the work at the clinics, appeared to be of a wholly modern and satisfactory type. The principal thing lacking is the home instruction by nurses, which has proved so vital a factor in such work in America. A beginning along this line by fifteen nurses doing home visiting in Petrograd has been made, but the municipalities have not as yet any facilities for such educational work. All the infant welfare work in Russia, and particularly that in Petrograd, is gravely hampered at the present time by the shortage of milk which has resulted from the War and from the Revolution.

General Status and Future Needs of Public Health in Russia.

Public health work in most countries has passed from a stage in which the sanitation of the environment was its chief preoccupation to one in which the control of community infections by epidemiological, bacteriological, and serological methods is predominant; and from this second phase it tends to proceed to a third, in which emphasis is laid on the hygienic education of the individual.

The first of these stages, that of sanitary engineering, has so far been somewhat neglected in the development of Russian public health. In 1912, out of 1,063 towns and urban settlements with a population of over 10,000, only 219, or 20·6 per cent., had an organized water supply of any kind, only 167 supplied this water to private houses, and only 59 had filters. As pointed out above, there are to-day not more than a dozen cities that have modern sewerage systems, and only half this number have systems of sewage treatment. The custom of boiling water and cooking milk before use materially assists in preventing the epidemics that we should expect might follow. At every railroad station, for example, there is a tank of boiling water with a tap from which water may be drawn for tea, and the crowd of soldiers and other passengers running out with their teapots to these taps is the most characteristic feature of Russian railway life. As is the case all through the East, in China and Japan, one is struck with the extent to which cookery may take the place of sanitary engineering. From the standpoint of nuisance, too, it is somewhat remarkable that the night-soil removal system of Petrograd, for example, can be conducted with so little offence to the senses. It was only after several weeks of residence that I learned that the sewers of the city did not dispose of its fæcal wastes.

Modern sanitary engineering will, of course, have its day in Russia, and when the time comes its development will be a fruitful one. Russian engineering is solid and successful. The smaller water purification plant at Petrograd, though costly both in construction and operation, has interesting features in its design, while experiments at Moscow are probably the most extensive and important sewage-treatment studies which are being conducted anywhere in the world to-day.

The principal developments of Russian public health have been along medical and bacteriological lines, in the control of the more acute communicable diseases and in the field of vital statistics. The statistical bureaus of the central council of public health and of the larger cities are better equipped with funds and with highly trained specialists than our own. The bacteriological and chemical laboratories are also highly developed and in charge of high-grade men with leisure and inclination for productive research as well as routine duties.

The control of communicable diseases is in general reasonably effective in the large cities; and the leaders in this field are in sympathy with the modern American view as to the supreme importance of bedside care of the individual and the detection of carriers as compared with the terminal

national Health Commission, United States of America, having called special attention to the hopeful results obtained by the hypodermic use of chaulmoogra oil mixture, Government directed last year that a trial should be given to this method in leper asylums of this Presidency. The experiment at the Gobra Leper Asylum has been undertaken by Sir Leonard Rogers. He, however, very soon abandoned the original somewhat crude and very painful method, and by extracting the gynocardic acid, which appears to be the active principle, and injecting it as a gynocardate of sodium, he considers he has produced far better results, and comparatively painless. This investigation is, however, still in an experimental stage.

I may here call attention to two other diseases (diabetes and hook-worm) which, at the suggestion of Sir Pardey Lukin, and at the expense of the Indian Research Association, are being investigated in Bengal.

Diabetes.—On January 1, 1915, Major McCay, of the Physiological Department of the Medical College, was instructed to inquire into the causes of the prevalence of diabetes in India. Since that date he, ably seconded by his staff, has done a large amount of valuable work in relation to this disease.

Extensive research work has been carried out regarding the tolerance of different individuals, healthy and diseased, to sugar; and many new facts have been ascertained from examination of the blood and urine concerning the ætiology and pathology of the disease. This inquiry is still proceeding.

Hook-worm.—For the last two of the three years under consideration, Lieut.-Colonel Clayton Lane was appointed by the Research Association to carry out an investigation regarding the prevalence of this disease among the coolies of the Darjeeling tea estates. He was able to show that over 50 per cent. were suffering from this complaint, and that by ridding them of the parasite their working capacity was increased 25 per cent.

It is now known that this disease is extremely prevalent in many parts of India and causes an infinite amount of sickness and incapacity. In Bengal the population of all the district jails are to be examined, this will give a fair index of the incidence of this very serious disease throughout the Province. The only way to combat this disease is to teach the people to use properly managed latrines instead of resorting to the open ground. The eggs pass out with the "motions," and the "larvæ" a few days after being hatched are able to penetrate the skin of newcomers and so gain access to fresh "hosts."

There has been an increase in the number of surgical operations in this Presidency during the past triennium. An improvement is also noticeable in the character of the operations.

The reputation of the Calcutta hospitals for skilful surgical work was fully maintained. The possibility of anæsthetic difficulties occurring has now been minimized by the appointment of two trained anæsthetists in this hospital.

In the surgical work of the Howrah General Hospital hydrocele and scrotal tumour among the operations were by far the most numerous. There were 21 operations for hernia, with 2 deaths (in strangulated cases), and 26 abdominal sections, with 8 deaths. These latter cases often come in late and in a desperately bad condition.

I particularly want to call attention to the fact that in the Howrah Hospital the use of absorbent cotton wool, which is such a great item of expense, has been practically entirely abandoned in favour of absorbent jute. The jute mills give the jute free to this hospital. In the hospital it is made absorbent by boiling with "saji-matti, teased, and then made into pads with coarse *mal-mal* and sterilized. I have taken a great deal of personal interest in this question of absorbent jute dressing. The Presidency Jail has now taken up the industry. The price at which the jail has offered to sell its absorbent jute dressings is 4 annas per lb. in bulk, and 5 annas per lb. in packets. This dressing, though not declared sterilized, has all been boiled, but medical officers are recommended to sterilize it further before use. From communications recently received I understand that the Lister Antiseptic Dressing Company produces absorbent jute dressing which has been certified to be sterilized, but it is more expensive.

The percentage of deaths among patients operated on last year was remarkably low, being 0·15 as compared with 0·2 in each of the two preceding years and 0·9 in 1913.

Lady Minto Electrical Annexe.—This institution has been of the greatest help to the Medical College Hospital in the diagnosis of medical cases as well as in its surgical work. Surgical and medical cases were treated here by X-ray exposure and other electrical methods. In addition there were 1,304 skiagrams and 2,730 screen examinations. This gives some idea of the importance of the work done in the X-ray Department. During the period under review a second dark-room has been added, and an apparatus for X-ray examination of patients in the erect position has been fitted up. This department is growing in popularity with outside practitioners, many of whom now send private cases for diagnosis.

Colonial Medical Reports.—No. 86.—British Guiana.

REPORT OF THE SURGEON GENERAL FOR 1916.

By K. S. WISE,
Surgeon General.

General.

Dr. F. E. Field continued till June 30 in charge of the campaign against hookworm disease carried on by the International Health Board of the Rockefeller Foundation. In view of the depleted number of medical officers in the Government Medical Service it then became necessary for Dr. Field to resume his ordinary duties, and the International Health Board sent out Dr. Dershimer from the U.S.A., who has carried on the work from July 1 to December 31.

Hospitals.

The number of in-patients is greater this year, especially in the hospitals of Georgetown and New Amsterdam; in the case of Georgetown the average daily number was 318 in 1915 and 335 in 1916. The number of in-patients is, however, below the average of the previous five complete years.

The number of out-patients has greatly increased, especially at the Public Hospitals at Georgetown and New Amsterdam.

It has been common in years past for East Indians who live on estates and who have an estates' hospital within easy reach to avoid them and apply at the Public Hospitals. While such East Indians have every legal right to attention at the Public Hospitals there is often little or no reason for avoiding the local estates' facilities, and there is every reason why the burden of medical treatment should fall on the estate and not on the colony as a whole. This burden is acknowledged by the estates' proprietors, who willingly accept it and express every desire to treat their East Indian labourers on the estates.

As usual phthisis, pneumonia, Bright's disease, enteric fever and dysentery show the highest mortality.

In the Public Hospitals, Georgetown, water-closets were introduced and all pails removed. This was completed by the middle of 1916, since which date no pails have been used.

Owing to the absence of any sewerage system in the city the water-closets are connected with septic tanks, and these, once the active scum was formed, have worked satisfactorily.

The mortality from pneumonia was again high this year, there being 93 deaths among 145 patients. Phthisis brought 292 patients with 88 deaths, and bronchitis 276 patients with 28 deaths.

Special efforts have been directed to the block set apart for tuberculosis. It had become mainly a place for dying consumptive patients where they lingered till death relieved them, a place repulsive to most and feared by those sent there. This is now changed, patients such as the above are removed to the Alms House, the wards have been made brighter and more cheerful, and a more generous diet provided; patients in the earlier stages alone, those in a curable stage and amenable to treatment are alone admitted. Instead of shunning the block these patients now readily go there at a time when the disease can be checked and learn by practice the careful personal hygiene required of consumptive patients. At the same time special types of treatment have been adopted including the use of the different kinds of tuberculin.

Th general surroundings of the Public Hospital, Suddie, have been much improved by better drainage, removal of bush and levelling of lower spots. The thickly grown area to the south has been cleared and is now let to farmers who keep it clear and cultivate ground provisions thereon.

Asylums.

Lunatic Asylum.

I visited the institution on four occasions and always found everything in excellent order. The patients looked clean and tidy and appeared contented. The sanitary arrangements are as satisfactory as possible.

In the last quarter of the year the type of chronic conjunctivitis resembling trachoma appeared in about thirty inmates. Owing to the precautions adopted there has been no great spread of the disease.

Leper Asylum.

The drainage is not satisfactory and a scheme for improvement is now being prepared. A deep artesian well was sunk in the Asylum during the latter part of the year and the flow is sufficient to supply all needs.

Religious services and school attendance has regularly continued.

As amusements regular concerts, secular and religious, are held. Variety entertainments and magic-lantern shows are given. A new piano, the gift of His Excellency the Officer administering the Government, is now in use and the music has afforded the greatest pleasure and delight.

Industrial work about the Asylum in farming still forms a great part of the inmates' occupation and is of material assistance to the upkeep of the Institution.

The general conduct and demeanour of the inmates continue at a satisfactory standard.

The mortality continues low, being 37 deaths during the year, equivalent to 10·7 per cent. per

annum. Seventy-three per cent. of the 37 deaths were directly due to leprous lesions, while 27 per cent. were directly due to general diseases, such as tuberculosis, Bright's disease, malaria, &c.

Public Dispensaries.

In Georgetown there are two dispensaries, and another five country dispensaries. The dispensers in charge are provided with boats for the purpose of paying periodical visits to the different grants, homesteads and missions. Free medicines were supplied to the eight existing missions.

Prison Hospitals.

In the prisons of Georgetown and New Amsterdam sickness has kept at a low rate, being in the major part malaria and intestinal disorders in those recently admitted. Quinine was given to convicted prisoners in Georgetown and New Amsterdam. At H.M. Penal Settlement the improvement of health continues, though the figures show a slight increase over last year.

The continued low rate of malaria is a testimony to the constant attention to sanitary details. Quinine was given prophylactically during the first half of the year but not during the latter half. All prisoners are examined for the presence of hookworm infection, and if infected duly treated.

There is again an increase of intestinal diseases, in diarrhœa and dysentery. The first half of the year was almost free from these diseases, there being nine cases during January-June. During the last part of the year both diarrhœa and dysentery increased, there being twenty-four cases. This coincided with increasing prevalence of flies. A similar increase of flies with increased intestinal troubles occurred at the Settlement last year.

The Director of Science and Agriculture was kind enough to arrange for the Government Economic Biologist to visit. This Officer submitted a careful report, pointing out not only the actual, but also the possible breeding places. Effect has been given to his recommendations, the flies are becoming less and less until only few can be found, and the intestinal disorders are now absent.

The Onderneeming Industrial School for Boys.

The average daily number of boys was 132; the percentage of sick to this daily average was 4·59 in 1915 and 1·97 in 1916. The prophylactic use of quinine has produced a marked improvement in the incidence of malaria fever.

All cases, with the exception of trivial ailments, were treated at the Public Hospital, Suddie. No disease of epidemic character occurred during the year. The fly nuisance has been considerably lessened due to special efforts made by the Superintendent and the Medical Officer.

Alms House and Orphan Asylum.

Alms House.

The average number of inmates in the whole Institution was 751. The total number treated in the infirmary wards of this Institution was 4,663 for the twelve months, against 2,157 of the previous nine months. The death-rate per cent. of patients treated was, however, 21·3 against 22·7 of last year.

The commoner causes of death were Bright's disease, chronic bronchitis, diarrhœa, chronic dysentery, phthisis, tertiary syphilis, senility, and general debility.

A large number of those treated at this Institution suffer from chronic and intractable ulcers.

All those admitted were carefully examined for hookworm infection. Of the 2,487 thus examined, 44 were found infected and treated by thymol.

The general increased cost of living has had a grave effect on those who exist on charity, and many who were just able to keep themselves from the Alms House have been unable to do so longer and this Institution has found its capacity taxed to the utmost. In the latter part of the year an additional fifty-eight beds was made available and relieved somewhat the difficulty.

Special attention was given to the prevalence of house-flies in the Alms House, and the Director of Science and Agriculture kindly allowed his officers to make a careful monthly study. At the same time the Chief Sanitary Inspector of the Government Public Health Department regularly visited the Institution and made recommendations.

The general conclusions come to were that the flies were not so much bred in the Alms House as attracted to it from breeding places around; that the most effective means of control was the use of fly-papers, which can be made cheaply in the colony; that flies have a season in British Guiana corresponding closely to the relative humidity; and that the diarrhœa and dysentery at the Alms House was in all probability spread by them.

Every endeavour was made to check these flies, fly-paper being used freely, rubbish, &c., carefully and regularly collected. Food and garbage was specially fly-screened, the clothing of diarrhœa and dysentery patients specially disinfected immediately after use.

The pail system used for many years at the Alms House has now been changed and water-closets installed, much to the improvement of the whole Institution. Since December no pails have been in use and a source of much nuisance has ceased. Owing to the lack of sewerage in the city the water-closets are connected up to septic tanks which, once a good scum has formed, are working satisfactorily.

Orphan Asylum.

There has been a great reduction in the number of orphans and they have now almost all left the Asylum. This is due to a change of system by

Return of Diseases and Deaths in 1916 in Georgetown, New Amsterdam, Suddie, Bartica and North-West District Hospitals,

British Guiana.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	16	1	16
Anæmia	72	9	72
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	8	1	8
Chicken-pox	16	—	16
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	148	28	148
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	8	2	8
Diabetes Insipidus	1	—	1
Diphtheria	6	1	6
Dysentery	246	60	246
Enteric Fever	215	56	215
Erysipelas	3	1	3
Febricula	4	—	4
Filariasis	—	—	—
Gonorrhœa	178	—	178
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	39	—	39
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	28	3	28
(*c*) Mixed	—	—	—
Malarial Fever—	—	—	—
(*a*) Intermittent	1,258	49	1,258
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	12	3	12
(*c*) Pernicious	140	30	140
(*d*) Malarial Cachexia	1	—	1
Malta Fever	1	—	1
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	55	—	55
Malignant	53	7	53
Old Age	16	4	16
Other Diseases	12	5	12
Pellagra	5	2	5
Plague	—	—	—
Pyæmia	2	2	2
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	159	1	159
Rheumatoid Arthritis	—	—	—
Scarlet Fever	1	—	1
Scurvy	—	—	—
Septicæmia	36	36	36
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(*a*) Primary	8	—	8
(*b*) Secondary	44	3	44
(*c*) Tertiary	47	5	47
(*d*) Congenital	18	9	18
Tetanus	18	9	18
Trypanosoma Fever	—	—	—
Tubercle—	15	15	15
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—
General Diseases—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	8	—	8
Yaws	91	—	91
Yellow Fever	—	—	—

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	650	25	650
Circulatory System	—	—	—
(*a*) Valvular Disease of Heart	28	10	28
(*b*) Other Diseases	175	41	175
Digestive System—	—	—	—
(*a*) Diarrhœa	325	43	325
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	31	2	31
Congestion of Liver	2	—	2
(*d*) Abscess of Liver	7	1	7
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	17	1	17
(*g*) Cirrhosis of Liver	46	18	46
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	916	107	916
Ear	34	—	34
Eye	361	—	361
Generative System—	—	—	—
Male Organs	419	2	419
Female Organs	1,838	66	1,838
Lymphatic System	171	—	171
Mental Diseases	145	—	145
Nervous System	234	39	234
Nose	14	—	14
Organs of Locomotion	254	8	254
Respiratory System	1,185	349	1,185
Skin—	—	—	—
(*a*) Scabies	26	—	26
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	11	—	11
(*f*) Other Diseases	548	3	548
Urinary System	691	195	691
Injuries, General, Local—	697	17	697
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(*c*) Other Injuries	—	—	—
Parasites—	8	—	8
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	165	13	165
Filaria medinensis (Guinea worm)	285	24	285
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	4	—	4
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	6	2	6
Nature Unknown	—	—	—
Other Poisons	4	—	4
Surgical Operations—	—	—	—
Amputations, Major	—	—	—
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	—	—	—

which the children have been handed over to their relatives or to approved homes.

The general health was good, and the sickness was of temporary and trivial nature.

General Health.

The general health of the Colony during 1916 continued satisfactory. The five years 1912-1916 inclusive constitute a record for health in the Colony, being unequalled by any other five-year period in the last fifty years.

Malaria, hookworm disease, respiratory and intestinal disorders undermine the constitutional strength of the people, chronic maladies intervene which, exacerbated by unfavourable climatic changes, lead to poverty, misery, charity and death. Of such are the difficulties which face the medical and sanitary organizations of British Guiana, difficulties which gradual sanitary changes will alone alter; changes which cannot be expected in a few years but will be the work of a generation.

There has been no natural increase this year in the population. The excess of immigation over emigration is accountable for what increase there is.

The birth-rate has shown a woeful decrease. This decrease in the number of births has occurred in city, town, villages and estates alike, has affected all races equally, and has appeared as a marked phenomenon in all three counties. In the last fifty years but one year alone (1894) shows a lower birth-rate than 1916. This exceptional decrease may be considered an exhaustion after the exceptional high birth-rate of recent years, may be attributed to the grave change in economical conditions, cost of living, &c., or to the severe epidemic of malaria and intestinal disorders at the end of 1915 and beginning of 1916. It is difficult to state definitely the cause, but it is an established fact that severe mortality in one quarter adversely affects the number of living births six months afterwards.

The death-rate for 1916 is 27·1 per 1,000 persons living. The mortality of infants continues at a lower level than in the past ten years, though the rate is anything but satisfactory.

There has been no case of cholera, yellow fever, plague or small-pox during the year. There has been no case of plague or cholera in the last forty years.

Urban Districts.

The City of Georgetown in common with the rest of the Colony suffered from a marked decrease of births.

The number of deaths on the contrary is little changed. In considering this fact one should remember the much higher cost of living and the undoubted increase in poverty in the city.

The deaths of infants showed a marked decrease this year and is a tribute to the persevering work of the lady health visitors and of the Baby-saving League. The rate is still far too high, but there is no reason why the steady reduction in the past should not continue for many years yet and bring the city within reach of European standards.

The number of notifications and deaths from enteric fever remained much the same this year as last. This is anything but a satisfactory record in spite of every effort by the Medical Officer of Health to isolate cases early in their onset associated with thorough disinfection. Inoculation is not readily accepted by the contacts of notified cases though offered free of all charge.

So long as this city continues to rely on a very mediocre system of water supply and on an utterly inadequate system of sewage disposal mainly consisting of midden pits, it is little likely that the efforts of the Municipal Health Department will meet with much success in reducing this or other cognate diseases.

The number of deaths from all forms of tuberculosis, principally phthisis, shows little change this year (178 in 1914, 150 in 1915, and 157 in 1916). This is a low rate for a city such as this in the Tropics, and represents the excellent work of the British Guiana Society for the Prevention and Treatment of Tuberculosis, which has now passed its tenth year.

Malarial fever shows an unwelcome increase in the city. There are two large swampy areas, Queenstown Ward to the east, and Nonpareil Park to the north of the city. In wet periods the Anopheles larvæ are readily found in both these areas. The Municipality have already begun on levelling and filling up the Queestown area and in an excellently thorough manner, and it only remains to complete both these areas in the same way.

The Town of New Amsterdam, as elsewhere, has shown a great reduction of births.

Village Areas.

These areas are extensive and scattered and improvement can only be slow. As before, lack of drainage, presence of low bush and unnecessary vegetation leading to dark, moist and airless surroundings, irregular mosquito breeding pools, unscreened barrels, and absence of privy accommodation, represent some of the removable evils.

The customary water supply is of the most primitive character, is of bad quality, and at times lacking in quantity. Ponds and trenches fed by rain or surface peaty water led through canals for many miles and freely open to surface pollution in most cases represent the only supply. Provision has been made for sinking wells in villages. These wells provide a supply vastly superior to the trench water, and there can be little doubt that the extended provision of these will lead in time to a great reduction in the present numerous deaths, incalculable sickness, and irreparable loss due to intestinal troubles.

The International Health Board had completed its extensive campaign against hookworm disease in certain districts last year and has now entered on the Buxton district, thus gradually extending up the East Coast of Demerara.

Enteric fevers are becoming unduly prominent in certain villages. Elsewhere the cases reported are only occasional and at long intervals.

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Dr. Gewand writes: "I regret to say the Skeldon district is in a decidedly disgraceful insanitary condition." He further condemns the local water supplies, and recommends the sinking of deep artesian wells.

The Port Mourant district reports an excessive amount of sickness in the latter part of the year with an unusual amount of dysentery and diarrhœa. Whooping-cough was very prevalent in the early part of the year.

Dr. Ozzard refers to the very bad condition of Adelphi village, and considers sanitary measures and drainage generally as "sadly in need of being called into existence."

Dr. Fiddian, reporting on the Mara district, states that malaria takes its heavy toll at the two extremes of life, and points out that superstition and conservatism make the diffusion of sanitary measures and quinine prophylaxis especially difficult.

Dr. Craig, in the Cotton Tree district, points out the swamped condition of several of these villages for a great part of the year. He condemns the water supply consisting of barrels and ponds, and also the habit of collecting cattle, sheep, and goats under and close about the dwellings.

Dr. MacAdam, in the Mahaicony district, states that "the water supply is bad. The dirtiest of dirty puddle water is frequently used for drinking purposes in dry weather, and even that is scarce during the drought."

In the Mahaica district considerable improvement is possible in the sanitary condition; the pit-privy system is satisfactory.

In one district the prevailing disease is malaria. Convulsions in children following an attack of malaria were frequent. Parents are so used to "only fever" and are alarmed only when convulsions come on.

Pneumonia here as elsewhere was our most fatal disease. The surprising part is that persons suffering from so severe a lung condition are able to get about and even work with the disease in an advanced stage when they should legitimately be bowled over as is the case in cold countries.

In the Wakenaam district medical aid is frequently sought for when too late to be of avail. The drainage generally is good; the Noitgedacht well "is a great boon to residents in the neighbourhood," but the need for latrines in these villages is great.

Malaria fever, ankylostome infection, respiratory diseases and bowel complaints are the prevailing diseases in the Suddie district. The water supply is not satisfactory.

The report on the villages in the Anna Regina district is as follows:—

"With regard to the villages a great deal remains to be done. I am glad to say that with the appointment of a sanitary inspector and a certified midwife progress has been made. The lots have a neater and cleaner look, the drainage is improving, and suitable Dershimer latrines are being erected. Of course a certain amount of opposition is to be expected, and I deprecate too much leniency in connection with the attitude of defiance taken up by some proprietors and villagers. They seem to know more than the sanitary inspector when required to do certain things, and some well-to-do and educated (?) persons aired their views on sanitation and the bearing of the mosquito question on malaria and other diseases. In these cases, where persuasion fails stronger measures must naturally be taken by the authorities for the benefit of the villages. The adequate screening of all water vessels should be thoroughly carried out. The well at Danielstown has only a receptacle flow, but the one at Westburg has a splendid one. There is no other well in the district, save at Perth—a satisfactory one. There should be others, as after a short drought there is a great scarcity of good water. The opposition to the certified midwife is being overcome, and good work is done by her. Instruction *re* infant feeding has not yet achieved the desirable. Grandmothers, of course, know all about it—with disastrous results in many cases. I saw a nine-day-old baby being fed by its grandmother. A huge spoonful of thick gelatinous pap—half the spoon in the baby's mouth—and with her thumb she was ramming it into the little mouth—like a grease pump—and just as fast as this was being done most of it was coming out again, but some must have got through the tiny œsophagus. The mother was ill and I had been called in to see her; she had milk, but because she was not well this barbarous method was adopted. Instead of barbarous I should say "civilized," as the veriest barbarian would suckle her child.

Hookworm disease is still prevalent in the villages with disastrous effects on young pregnant women, especially the East Indians. I do all I can to assist in these cases, and have found chenopodium very useful, and least objectionable method of treatment. Capsules are the most convenient way of giving it among the villagers. In a good many cases stool examinations are made.

Dr. Earle in the Philadelphia-Leguan district describes the general health as "fairly good," and the mortality as "higher than it ought to be but not excessive." He considers the sanitary condition throughout as very far from satisfactory; little or no pride is taken in home surroundings. The East Indian, when "not at work on the estate, is concerned with his cow and his rice; amongst the blacks, the bread-winner is often away from home, in the gold-fields, in the bush, or on his provision beds aback; the homes in either case are neglected, squalid and insanitary. Proper latrine accommodation is practically non-existent. The water supply as a rule from a roadside trench open to any and

every pollution. Lots and trenches are not properly weeded. Bridges are often dangerous. It is the exception to find adequate drainage attended to."

In the campaign against yaws, 106 cases were treated effectively without a single untoward symptom, though the injections of novarsenobenzol were certainly painful.

Sugar Estates.

The sugar estates in general present a great contrast in sanitary conditions when compared with the villages. One finds well-drained yards, a great reduction in mosquito breeding-places, absence of all thick bush and the universal provision of latrines. The prevalent diseases were much the same as in the villages.

Enteric Fever.

This year there has been a decrease in the number of notifications. There has, however, been an increase in the deaths. Many inoculations were done in the sugar estates but few in the villages. Inoculation should be more widely adopted, and steps are being taken to extend the practice more fully in the city, town and villages. Inoculation, however, should not be regarded as a satisfactory substitute for proper methods of sewage disposal, to which one looks for freedom from enteric fever.

Tuberculosis.

This disease has shown a slight increase this year. Ten years of work have now been accomplished by the British Guiana Society for the Prevention and Treatment of Tuberculosis, and it is a pleasure to record the excellent work and unremitting efforts of the two lady health visitors, who come into touch with the actual home life of the people and are able to instil into them the simple rules of personal care and attention.

Efforts are being made to extend the society's work to areas outside the limits of the city of Georgetown. The disease is most prevalent in the city of Georgetown and the town of New Amsterdam, but in almost every village and estate cases occur from time to time.

Malaria.

This disease shows a slight decrease during the year. The preponderating effect of malaria in causing sickness and deaths in British Guiana is amply apparent to those who study these questions.

It does not appear to be commonly realized that each attack of this disease does some injury to the human machine, leaves some organ weaker than it was before, and lessens the time during which the body can continue to resist the other diseases in its surroundings. The terminal illness is often not at all the one which has been the deciding factor in determining the patient's death; it is frequently but the last inimical process to attack the weakened patient, a patient exhausted and with diminished resistance, the result of previous attacks of malaria.

Malaria is a paramount influence in determining the average duration of life in areas where it is endemic. This influence is not only one directly affecting the individual, but it has also its effects on the offspring. A mother suffering from chronic malaria cannot satisfactorily nurse her child, and the child in its pre-natal state will suffer from the various degrees of infantile debility so common in this country, and which will only be diminished to a minimum with healthy parents. A father saturated with chronic malaria cannot provide the adequate economic status for the family.

Infected individuals have their efficiency impaired as parents, as workmen, and as citizens. A malarious population can be expected to be physically and educationally subnormal according to the degree of prevalence of the disease.

Malaria is not alone a health problem; it is equally an economic problem which merits increased consideration aside from its relation to health alone.

The purpose of Health Departments is to promote the welfare of the people by securing them from exposure to adverse conditions. Malaria is a factor which affects very large numbers of our population, and great attention has therefore been paid to this disease by the Government Public Health Department during the year 1916. Efforts have been made to estimate the comparative number of anopheles in certain areas, where numerous, to trace their actual breeding places and then eliminate or reduce them.

It is a common belief that the prevention of all anopheline breeding in a place is a physical impossibility with reasonable expenditure. This yet remains to be proved, but it is amply clear now that in certain areas anopheline breeding places can be easily reduced to such a minimum that malaria shrinks to comparatively small importance, and that also with reasonably small expenditure. I consider that increasing experience in this direction will enable the Public Health Department to direct expenditure to the accomplishment of vital works in this malarial problem and avoid expenditure on what are otherwise merely desirable.

Special work in this direction has been done in the villages with gratifying results in most cases. In several villages the officer specially deputed for this duty had for long periods (several months at a

time) great difficulty in finding anopheline mosquitoes; with a view to obtaining better data experiments with mosquito traps are now being developed.

Success, however, has not been met everywhere, and special difficulties have been found which being clearly realized can in time be obviated. Reference may be made specially to the almost universal prevalence of shady drinking ponds and to the commendable industry of the East Indians at La Grange in cultivating rice alongside and around their houses —a practice that can only lead to disastrous results.

There are several important problems in this malarial question which will require early and careful consideration. A few are mentioned below:—

(*a*) The effect of swampy front lands belonging to villagers, estates, or private owners on the health of adjacent communities.

(*b*) The influence of rice cultivation, the provision of "buffer areas" free from such cultivation around populous areas.

(*c*) Economical methods of detecting and eliminating dangerous areas in small communities.

(*d*) The habit of selecting unprepared and most unsuitable areas to build upon, e.g., a high dam with undrained swamps and rice cultivation within a few yards on either side.

(*e*) The grave danger of opening up new agricultural areas, especially on creeks.

The sale of quinine in towns and villages has continued during the year, and though the actual price to the Government had considerably increased, in view of the importance of quinine to the community, the selling price was not altered.

Quinine has a distinct value in preventing malaria, but it must never be considered that the prophylactic use of quinine renders other measures unnecessary. Quinine can never take the place of permanent and thorough drainage with careful and constant attention to unavoidable water collections. Quinine prophylaxis does not entirely prevent malaria even when most thoroughly carried out, and it is moreover the most expensive way of obtaining a reduction of malarial fever.

Owing to the difficulty of obtaining quinine and to the present high price, systematic use in the primary schools has been curtailed, and quinine has only been supplied for the more particularly malarious months of the year.

Much has been done on the sugar estates towards eliminating the periodic epidemic of malaria. These measures consist mainly in careful drainage in the yards with constant prophylactic use of quinine supplied free for the labourers. This excellent work should, however, be extended beyond the yards proper to pasture and other settlements on estate lands.

All prisoners, members of the police force and their families, the boys of the Industrial School, the children of the Orphan Asylum, and attendants at the Government institutions are supplied with quinine free.

Ankylostomiasis.

On the sugar estates the following measures are in force:—

(*a*) The provision of latrines on all estates which in the majority of cases are well used.

(*b*) The microscopic examination and treatment of all newly arrived immigrants from India. Of these, as a rule, 65 to 80 per cent. are found infected.

(*c*) The microscopic examination and treatment of all immigrants who attend the hospital, whether with symptoms of ankylostomiasis or not.

(*d*) On several estates a microscopic examination and treatment of all immigrants resident on the estate is gradually proceeding, and it is probable that in many the degree of infection is now well below 20 per cent.

Severe types of ankylostome anæmia are now rarely seen; the milder type of infection with chronic degenerative changes is most often encountered, the principal fatality occurring amongst pregnant females too anæmic to survive the extra burden of childbirth.

An active campaign in the villages against ankylostome infection has been carried out for three years by the International Health Board of the Rockefeller foundation in America. The work is systematic and thorough, and is based on a house-to-house census, followed by microscopical examination and thymol treatment.

It is estimated that some 35,000 people have been examined, some 55 per cent. found infected. These have almost all been treated, and with the exception of a small percentage freed wholly or about wholly from the infection.

At the same time a sanitary campaign is carried out by the Government Public Health Department to enforce the erection of latrines in addition to general sanitary precautions. Much success has followed, and about 2,500 to 3,000 new latrines have been erected and are in use.

Infant Mortality.

The loss of life under twelve months of age is still very unsatisfactory. The infant mortality rate for the colony was 190 per 1,000 living births, and for

the city of Georgetown 204. This latter figure is the lowest on record up to the present. It is, however, much greater than it should be.

An outdoor Maternity Department has been maintained at the Public Hospital, Georgetown, for poor women who do not enter the hospitals but are delivered at their own homes. Special nurse midwives are subsidized by the Government in more remote country districts.

The principles of infant care and feeding are now taught by all female teachers in primary schools under the advice of the Government medical officer of the district. Special classes with demonstrations for female teachers and assistants were held in Georgetown and New Amsterdam.

The Baby Saving League is an organization, including the principal members of the community, subsidized by Government funds and carrying on work directed towards the reduction of infantile mortality.

The League maintain branches, clinics for mothers and babies, and a system of home visitation by the nurses. In each district a trained qualified nurse midwife is subsidized. In addition a crèche has been maintained in Georgetown during the whole year. The scope of this League's work is gradually extending over the colony, and there is ample evidence to show that its influence is being felt in the districts.

Medical Inspection of Schools.

Arrangements were completed during this year for the first routine examination of school children in primary schools.

This work is only in its early stages, but Dr. Rose reports provisionally the following outstanding features: (*a*) Low standard of nutrition; (*b*) high percentage of infection with round worm (60 per cent.); (*c*) low percentage of infection with hookworm (2 per cent); (*d*) splenic enlargement uncommon; (*e*) rarity of enlarged tonsils and adenoids; (*f*) general excellence of the teeth; (*g*) large amount of defective vision; (*h*) rarity of pulmonary tuberculosis (by clinical signs).

Public Health Department.

The measures enforced in general are the clearing of inter-lot drains, adjusting the level of lots, weeding off low bush, whitewashing and banking pit privies, screening of vats and barrels, and removal of grosser sanitary nuisances.

This work is inevitably very slow in progress and meets with much passive and, in places, active opposition. Much is done by persuasion and argument, but on occasions it is inevitable that appeal is made to the law.

Quarantine.

During the year quarantine was enforced for:—

(*a*) Plague against Venezuela, Brazil, and Liverpool.

(*b*) Yellow fever against Venezuela, Brazil, and Barbados.

(*c*) Small-pox against Venezuela and Brazil.

The regulations have been duly enforced, and no case of infection from these diseases has occurred within the colony.

Forty-eight ships were visited by the health officer.

The quarantine station has been inspected every three months and is kept in good order. The various disinfecting machines are regularly steamed and tried.

Vaccination.

Special lanolinated lymph from the Lister Institute, England, is now used instead of glycerinated lymph, and is found more successful.

The number of successful vaccinations during the past year was 1,934.

Venereal Diseases.

In conformity with the Report of the Royal Commission on Venereal Diseases arrangements have been made for the supply of salvarsan, &c., to all registered medical practitioners. Microscopical diagnosis and the Wassermann reaction is carried out in the Bacteriological Department. Special attention is paid to these diseases in the hospitals and asylums.

No legislation has yet been brought forward on this subject. This subject is now made a special lecture in the courses of training for nurses, dispensers, chemists, and druggists, &c.

Bacteriological Department.

This Department continues to carry out important investigation in addition to the general routine work.

The typhoid paratyphoid vaccine used in the colony is wholly prepared in this Department, and when used has been followed by excellent results.

Careful investigations have also been made into the conditions of typhoid convalescents discharged from the isolation hospital for infectious diseases and as to how far they are "carriers" capable of initiating infection. It is hoped ultimately to control any possible carriers in the future and render them innocuous as far as is reasonably possible.

Colonial Medical Reports.—No. 87.—St. Christopher and Nevis.

MEDICAL REPORT ON THE SANITARY CONDITION OF THE PRESIDENCY FOR THE YEAR 1916.

By W. H. FRETZ, L.R.C.P., L.R.C.S.Edin.,

Senior Medical Officer

Population, Birth- and Death-rates.

Statistics of Population in the Presidency of St. Kitts-Nevis.

	St. Kitts	Nevis	Anguilla
Estimated number of inhabitants in 1915	26,746	13,695	4,565
Births during the year 1916 ...	930	484	172
Deaths ,, ,, ...	840	270	66
Estimated number of inhabitants in 1916	26,836	13,909	4,671
Estimated increase...	90	214	106
Number of inhabitants at census on April 1, 1911	26,283	12,945	4,075

The above tables are calculated, as heretofore, on an estimated population of the previous year, and gives a death-rate as follows:—

St. Kitts.—31·301 per mille, against 31·703 per mille in the previous year.

Nevis.—19·411 per mille, against 22·124 per mille in the previous year.

Anguilla.—14·129 per mille, against 19·051 per mille in the previous year.

The birth-rate estimated on the same basis is as follows:—

St. Kitts.—34·654 per mille, against 35·069 in the previous year.

Nevis.—347·97 per mille, against 34·319 in the previous year.

Anguilla.—36·822 per mille, against 34·611 in the previous year.

Legitimate and Illegitimate Birth-rate for 1916.

	Legitimate births	Illegitimate births	Legitimate birth-rate per 1,000	Illegitimate birth-rate per 1,000
St. Kitts ...	256	674	9·539	25·115
Nevis ...	188	294	13·516	21·127
Anguilla ...	74	98	15·842	20 980

Infantile Mortality, considered as the annual number of deaths of infants under one year of age to every thousand of births, is enormously high, as the following tables show:—

	Number of deaths under 1 year	Rate per 1,000 of births
St. Kitts	262	281·720
Nevis	112	231·404
Anguilla	30	174·418

The subject has been much to the forefront lately, proved, as it has been, that "a high infantile mortality is a prodigal waste of natural resources." Statistics are against the assumption that poverty is the main cause of infantile mortality; ignorance and neglect are far more important. Congenital conditions, too, in a great measure account for this annual sacrifice, though the main cause lies not in hereditary weakness. "Nature intends all to have a fair start," but the the fair start is destroyed in the first few months of existence by (*a*) bad or insufficient feeding, and (*b*) neglect. Indications point to these as the main factors of the evil: (*a*) improper feeding by substituting farinaceous for milk food, (*b*) neglect caused, maybe, by industrial conditions. Mothers do not realize the importance of milk as a food. The only remedy for this condition of things is to overcome the ignorant tradition of centuries by educating the rising generation to fulfil the profession of motherhood, to help in removing the preventable causes of our waste of child life; and it is only by school instruction of the rising generation that any headway can be made. Education is the most important. We must first educate the teachers, for, however simple the instruction given may be, it is essential that those who impart such instruction should be well grounded in the elements of the subject, and thus may we hope to see a reduction in this particular factor in the death-rate. We must realize the fact that the wastage of infant life is enormous, and that the causes of those deaths, of the wastage, are so plain, so apparent, that there is an urgent call for the adoption of a complete systematic scheme against infantile mortality.

Public Health.

The health of the inhabitants for the year under review has been good. There have been no widespread outbreaks of any serious or epidemic disease.

Enteritis and Diarrhœa.—These show the highest number of deaths. Unwholesome food and climatic influences may be regarded as the main causes.

Leprosy.—There was a total of seventy-five cases remaining in the Lazaretto on December 31, 1915, thirty-nine males, thirty-six females; six cases (four males and two females) were received during the year 1916, giving a total of eighty-one cases under treatment.

It having been proved that leprosy is caused by a germ, the leper must be regarded as a source of danger, and the most effective way of suppressing the disease seems to be by thorough isolation of existing lepers. Wherever the disease has been treated by such it has slowly but surely died.

Yaws.—The results of the treatment of this disease by kharsivan has been exceedingly striking; much good work was done in this connection by our late colleague, Dr. Rat. Kharsivan not having been procurable for a time, continued treament of the disease has received a slight check.

Tuberculosis is prevalent, and our population is very susceptible to its ravages. Its infectious character should be widely known, and the danger in the sputa of tuberculosis should be impressed on the community.

Filariasis.—A disease extremely prevalent in the Presidency, and one of the many spread from man to man by a special mosquito. The necessity of trying to rid ourselves of these very unpleasant attendants is often brought to notice.

The District Medical Officers report as follows:—

Dr. Burton (Anguilla) says: The health of the island during 1916 has been excellent. No epidemic of any kind occurred during the year.

The sanitary conditions in and around the dwellings continue excellent, and this in spite of the scarcity of water. Even for washing purposes it is at a premium in this island at certain seasons.

The total number of deaths for the year was sixty-six, of which fifty-four were medically certified.

No successful vaccinations were performed this year owing to failure of lymph.

Dr. Rolston (Districts 6 and 8, Nevis) says: Amongst the labouring population the usual number of chronic ulceration of the legs and debility therefrom was treated. Amongst children gastro-intestinal diseases and the concomitants of worms were very prevalent.

Tetanus in the newly born infant is unfortunately not at all uncommon.

The districts which are not at present supplied by water from the reservoir on the west side of the island and which have to depend on cisterns have more cases of malaria, such as cotton ground. There are a large number of cases of filaria in the districts; this can only be controlled by a better water supply and the prevention of stagnant pools and old cisterns.

The health of Charlestown has been fairly good during the year, there having been no epidemics of infectious diseases. The school houses are overcrowded, I consider, far too many children being in one room, for their health or that of the teachers. This applies to country schools as well as town.

Dr. Napier (District 7, Nevis) says: The health of this district for the year 1916 has been exceptionally good; there has been no outbreak of any epidemic.

The infantile mortality due to gastro-enteritis has steadily decreased, owing to the precautions taken to rid the children of intestinal parasites. I find that 90 per cent. of the children suffer from these pests, so I have encouraged the mothers to bring their children for treatment even should the child appear nomally healthy. This scourge will remain in the island until there is improved sanitation.

The mothers are still ignorant of the fact that "milk food" is essential to the life of an infant. The licensed midwives should be a great help towards enforcing the mothers to realize this.

Considering the open-air life led by the peasant class, the amount of lung troubles is remarkable. The value of fresh air in the home is not duly appreciated.

The cases of framboesia are on the decrease.

The vaccination results for the year proved very effectual, 95 per cent. being successful.

D. Foreman (District 4) reports on the Leper Asylum and Emergency Ward as follows: During the year 1916 there were eighty-one inmates at the Leper Asylum, four less than last year.

Emergency Ward, Sandy Point.

Major operations: Strangulated hernia, 2; minor operations, 90; other surgical cases, 53; medical cases, 7; total, 152 cases. One death from septicæmia.

Maternity Ward.

Eleven accouchements with healthy children.

Four accouchements with stillborn children, two of which were twins.

One death from eclampsia.

Yaws Ward.

During the year 160 children and a few adults were treated with kharsivan, a good substitute for the German salvarsan.

Of that number sixty-seven were kept in the ward; ninety-three were sent home.

On December 31, 1916, District No. 4 was practically free from that loathsome disease.

Meteorological Record.

Rainfall in the Presidency in 1916.

Months	St. Kitts		Nevis		Anguilla
	Buckley's, leeward side of island	Hermitage, windward side of island	Cane Gardeo, leeward side of island	Old Manor, windward side of island	Centre of island
January	3·57	3·99	5·47	3·87	2·97
February	3·11	3·55	5·31	5·68	0·73
March	2·82	1·10	2·19	1·10	0·62
April	1·56	2·45	0·17	1·90	0·44
May	4·85	3·74	6·22	3·57	2·35
June	2·60	3·19	2·30	1·78	2·74
July	7·75	8·94	11·42	9·68	7·31
August	7·97	7·66	7·79	7·80	4·46
September	4·13	5·70	4·21	2·96	2·73
October	14·89	18·99	11·68	13·35	11·65
November	5·75	5·03	8·20	8·91	6·90
December	3·33	1·91	4·60	0·94	0·69
Total	62·33	66·25	69·56	61·54	43·59
1915	60·16	96·96	54·07	47·39	—

RETURN OF DISEASES AND DEATHS IN 1916 IN THE CUNNINGHAM AND ALEXANDRA HOSPITALS,

St. Christopher and Nevis.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	1	—	1
Anæmia	2	—	2
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	28	11	28
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	—	—	—
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	4	—	4
Enteric Fever	—	—	—
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	—	—	—
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	1	—	1
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	—	—	—
(*c*) Mixed	—	—	—
Malarial Fever—	38	1	38
(*a*) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	—	—	—
(*c*) Pernicious	—	—	—
(*d*) Malarial Cachexia	1	—	1
Malta Fever	1	—	1
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	2	—	3
Malignant	14	3	14
Old Age	1	—	1
Other Diseases	133	16	143
Pellagra	1	1	2
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	37	—	41
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	9	2	9
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	102	10	108
(*a*) Primary	—	—	—
(*b*) Secondary	—	—	—
(*c*) Tertiary	—	—	—
(*d*) Congenital	—	—	—
Tetanus	2	2	2
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—
GENERAL DISEASES—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	—	—	—
Yaws	5	—	5
Yellow Fever	—	—	—

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	123	3	126
Circulatory System	—	—	—
(*a*) Valvular Disease of Heart	21	10	23
(*b*) Other Diseases	4	—	4
Digestive System—	110	4	112
(*a*) Diarrhœa	18	5	19
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	—	—	—
Congestion of Liver	—	—	—
(*d*) Abscess of Liver	—	—	—
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	—	—	—
(*g*) Cirrhosis of Liver	2	2	2
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	—	—	—
Ear	3	—	4
Eye	—	—	—
Generative System—	—	—	—
Male Organs	52	—	54
Female Organs	43	2	46
Lymphatic System	—	—	—
Mental Diseases	39	2	45
Nervous System	2	—	2
Nose	6	—	6
Organs of Locomotion	15	—	20
Respiratory System	52	26	58
Skin—	145	—	161
(*a*) Scabies	—	—	—
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	—	—	—
(*f*) Other Diseases	—	—	—
Urinary System	53	12	53
Injuries, General, Local—	41	3	45
(*a*) Sirisasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	1	—	1
(*c*) Other Injuries	—	—	—
Parasites—	49	7	54
Ascaris lumbricoides	9	—	10
Oxyuris vermicularis	—	—	—
Doohmius duodenalis, or Ankylostoma duodenale	—	—	—
Filaria medinensis (Guinea-worm)	10	—	11
Tape-worm	3	—	3
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	2	—	2
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	—	—	—
Amputations, Major	6	1	6
,, Minor	18	—	18
Other Operations	169	3	162
Eye	26	—	26
(*a*) Cataract	3	—	3
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	—	—	—

METEOROLOGICAL RETURNS AT THE LABORATORY FOR 1916.

Months	Minimum	Maximum	Range	Mean minimum	Mean maximum	Mean temperature	Rainfall
January	67 ..	82 ...	15 ...	72·6 ...	78·7 ...	75·6 ...	4·05
February	67 ...	84 ...	17 .	73·4 ...	77·1 ...	75·2 ...	3·34
March	67 ...	84 ...	17 ...	73·6 ...	80·3 ...	76·9 ...	3·12
April	70 ...	87 ...	17 ...	75·0 ...	82·7 ...	78·8 ...	0·65
May	70 ...	86 ...	16 ...	76·7 ...	84·1 ...	80·4 ...	5·84
June	73 ...	88 ...	15 ..	77·0 ...	85·2 ...	81·1 ...	3·20
July	70 ...	89 ...	19 ...	76·6 ...	85·5 ...	81·0 ...	8·63
August	73 ...	91 ...	18 ...	77·5 ...	85·5 ...	81·5 ..	8·71
September	71 ...	87 ..	16 ...	76·2 ..	84·8 ...	80·5 ..	4·93
October	70 ...	89 ..	19 ...	74·7 ..	83·1 ...	78·9 ...	15·59
November...	69 ...	87 ...	18 ...	75·0 ..	82·3 ...	78·6 ...	6·46
December	69 ...	83 ...	14 ...	73·0 ...	79·9 ..	76·4 ..	3·17
Total	—	—	—	—	—	—	67·59

Rainfall for year 1916 ... ... 67·59 in.
Average mean temperature .. .. 78·74.

Intestinal diseases are common all the year round, but particularly evident during the rainy months, variations of temperature affecting their incidence. The same causes increase the incidence of rheumatic and allied conditions. Eye affections are extremely prevalent during high winds, and are largely due to dust and sand being blown about.

GENERAL HEALTH AND SANITATION.

The general health of the island has been good, and the island was free from any serious epidemic.

Bowel diseases were as usual the chief cause of death; it is not easy to say how far drought affects these cases, but weather does not seem to produce any immediate bad effect on the public health in these islands. The water, however, may become more or less unwholesome from long stagnation.

It is in the highest degree probable that affection of the stomach and bowels would be very much less prevalent than they are now if the people could be induced to boil all the water that they use for drinking purposes, but it seems impossible to teach preventive medicine to the labouring classes in these islands; if a child is ill and the doctor says it must be given boiled water, this will often be done, because the mother looks upon the boiling as a sort of medical obeah that conveys certain mystic healing properties to the water; but she never could be made to believe that water caught in her own clean (?) pail and fresh from the dam could possibly contain any deadly poisons. An important point to which special attention should be drawn is the overcrowding and want of ventilation of houses at night; nothing is more calculated to spread phthisis than this.

The protection of infant life is worthy of the highest considerations; death among these poor children is more often due to ignorance than to crime. Provision is made for the diseased and the destitute, but that form of charity is still wanting which will keep the healthy from disease and destitution, and reduce the number of those who overcrowd hospitals and poorhouses. Sanitation alone can accomplish this, public sanitation, and domestic sanitation. The former lies with the public authorities, but the latter, i.e., the practice of healthy living, without which public sanitation loses much of its value, must be left to private organizations. Something to this end may be done for adults by lectures and by circulation of printed rules, and for the young by instruction at schools, but little can be hoped from such means among an illiterate people. With these personal influence alone can prevail, and it is only the persistent efforts of the enlightened and benevolent that can impress them with the advantages of living healthy lives and with the truth of the saying, "cleanliness is next to godliness."

The partial dry earth conservancy still prevails. The present method of collection of night soil is unsatisfactory from a sanitary point of view, and bad in the extreme; the rapid removal and proper disposal of waste are most important for the health of the citizens. There can be no doubt that the hygienic reform most urgently needed is the introduction of a proper system of the excretal removal; many of the houses of the labouring people of Basseterre are arranged in a way that seems peculiar to the place; they are collected in what are called "yards"—that is to say, in spots where the huts are placed promiscuously and not by the sides of definite lanes and alleys. These "yards" are sometimes supplied with dry wells into which filth of all sorts is thrown, but nearly every yard has one or more privy pits, some deep, most shallow, but all decorated extensively with a few fragmentary rotten boards and shingles as a concession to the proprieties of civilization; in a small percentage of houses in Basseterre earth closets are used, in a few others the pail system is adopted, the former day's collection of feculent stuff being removed every morning; disinfectants and deodorants are thrown into the pails from two or three households, but more usually it is emptied without the addition of any chemical into the cart which conveys it away, every jerk and bump of the cart diffusing "pungent odours on the morning air."

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In a town like this containing about 10,000 inhabitants, the majority of whom live in detached one- or two-roomed huts, many of which are not even disposed in regular rows by closely defined streets or passages, it is not easy to see how sewerage by water-closet drains could be effected, nor would any of the ingenious and expensive systems in vogue in large cities be applicable. Space will not permit of my entering into a review of the various methods of disposal, as with us sanitation is proving a question of ways and means, and we must cut our coat according to our cloth. Let us be honest and content ourselves with the "earth closets," and, indeed, it may probably be taken for granted that the dry earth system is as good from a sanitary standpoint as the best of the other systems, or, at any rate, that it is the most applicable to the requirements of small towns and villages; its essential element is the burial of each stool in a sufficiency of dry earth; this system, backed and worked by the *suaviter in modo* and *fortiter in re* of a capable sanitary department, will be most efficient for our needs.

The Medical Department has not been up to its full strength since the War, and during the year we have to record the loss by death of Dr. J. S. M. Nurse after twenty-six years of faithful service in the department: he was a man of retiring disposition, devoted to duty, intense kindness of heart, with a strong sense of honour toward his profession and colleagues.

INSTITUTIONS.

Dr. Herbert H. Purinton, Acting Medical Officer of the Cunningham Hospital, reports as follows:—

There were 979 cases treated in the wards during the year, and 859 cases were treated in the out-patient department.

There were 100 deaths recorded at the hospital.

During the year 233 operations were performed, with four deaths resulting.

The above figures show an unusually low death-rate in both medical and surgical departments.

Patients to the number of 162 were treated for ulcers of various kinds, and in almost every case have gone away cured. It has been my policy to cure these cases before discharging them, firstly, out of a sense of justice to the patients, and secondly, because, in my opinion, it is economy to send them away well, so that they will not come back again in a few weeks to become a burden once more on the hospital; thirdly, by curing this class of patients the efficiency of the labouring element of the island is greatly increased.

Venereal troubles, especially of the syphilitic type, help greatly to swell the numbers applying to the hospital for treatment. With the idea of trying to check this terrible disease, I injected thirty-seven patients with salvarsan during the year with gratifying results.

A case of Raynaud's disease, or as it is sometimes called, Raynaud's gangrene, a very rare and interesting disease, appeared in the hospital several months ago, and is still there. The patient is a boy 6 years of age, with, so far as I am able to find out, a good family history. Gangrene developed first in both hands, followed soon after with the same condition in both feet, entirely destroying the life of these members, and causing them to rot off at wrist and ankle joints. No history of any injury or blood taint could be elicited.

In spite of all local and systemic treatment the disease has progressed until now the poor little fellow is without hands or feet. The stumps are healing by granulation.

This disease was first described by Raynaud in 1862, and is said to be due to local spasm and constriction of the small blood-vessels.

The grounds about the hospital have been much improved by the trimming of trees and cutting of wild bushes that had grown up about the place, and now present quite an attractive appearance.

The operating room has had two new windows added, and the covering over the stairway leading to it lowered, so that much more light is obtained. The windows of the operating room have been so screened as to exclude the filthy fly, beetles, &c.

Screens to all the windows and doors of the hospital wards are much needed. An incinerator for the destruction of rubbish and filth is also much needed.

Considering the numerous changes in the staff, the hospital has run very successfully during the past year and is doing good work for suffering humanity.

Dr. Herbert H. Purinton, Acting Surgeon of the Gaol, reports as follows:—

On January 1, 1916, there were thirty-six males and four females in the gaol. During the course of the year 269 males and 195 females were admitted, making a total of 464.

Of this number ninety-three complained of illness, and four males and nine females were sent to the Cunningham Hospital. All others were treated either in their cells or in the sick wards of the prison.

One female died in the hospital, and one was discharged from the prison on medical grounds.

The following table shows the diseases treated for the year:—

	Males	Females	Total
Skin diseases	5	1	6
Gastro-intestinal diseases	17	5	22
Respiratory diseases	9	2	11
Heart diseases	4	1	5
Eye diseases	11	0	11
Genito-urinary diseases	8	2	10
Rheumatism	4	3	7
Fevers	3	3	6
Abscesses and ulcers	3	2	5
Hydrocele and hernia	7	0	7
Aneurism	0	1	1
Adentitis	1	0	1
Ascarides	1	0	1
Total	73	20	93

The grounds and buildings of the gaol are kept

scrupulously clean. The food served the prisoners is of good quality and sufficient in quantity.

Discipline seems to be maintained with but little friction between prisoners and officials, and the institution is an excellent one of the kind.

Dr. Rolston, Medical Officer of the Alexandra Hospital, Nevis, reports as follows:—

The total number of cases treated in the hospital was 420; of these twenty were remaining in hospital at the beginning of the year 1916, and thirty-one remaining at the end of 1916.

There were twenty-nine deaths during the year.

The number of cases admitted was considerably over the number admitted the previous year.

In the treatment of yaws, I adopted the method of injecting the patients with kharsivan and allowing them to return to their homes, except in certain cases which required further observation.

Some improvements were made in the hospital; the floor in the Female Ulcer Ward was renewed.

A Berkefeld filter was fitted to the stand pipe and cased in.

Further improvements are urgently needed, however. The ulcer wards should be removed from their present position in the basement and placed outside the main building, as ulcers are by far the most difficult and chronic cases to treat, and should not be in a ward underneath the surgical and medical wards.

The nurses' quarters are not at all suitable or sanitary, as they are next to the ulcer wards, in the basement. I should suggest that the present yaws ward should be converted into ulcer wards, and the whole of the basement renovated and used for store rooms for hospital clothing and equipment, and this could be done, I am sure, without incurring very much expense, and the extra amount spent on it would be repaid in more sanitary conditions and better health for the patients and the hospital staff.

Colonial Medical Reports.—No. 88.—Saint Lucia.

MEDICAL REPORT FOR THE YEAR 1916-17.

VICTORIA HOSPITAL.

FIFTY-SIX patients remained in hospital at the end of March, 1916. Twelve hundred and thirteen patients were admitted during the year, making the number of patients treated during the year 1269, an increase of 105 over the previous year. Of the number treated, 541 were cured, 537 relieved, forty-seven not improved, seventy-five died, and sixty-nine remained at the end of March, 1917.

The principal diseases treated were venereal diseases—198, excluding sequelæ, but including re-admissions; malaria, 181; ulcers, seventy-seven; and injuries, fifty-seven. Sixty-six cases of syphilis were treated, being an increase of twenty-two over the previous year. Four deaths were caused by syphilis, but, as will be seen later, a number of stillbirths were due to hereditary syphilis.

One hundred and thirty-nine children were born in hospital, and of these five died shortly after birth. One of these infants died from congenital syphilis. Of the 134 children who left hospital apparently healthy some have probably since died from this disease, as in the majority of cases the subjects of hereditary syphilis are free from obvious signs at birth. There were, in addition, seventeen stillbirths, six of which were due to congenital syphilis, and four to prematurity probably caused by syphilis in the parents.

Mothers who show signs of syphilis or who give a history of repeated abortion or miscarriages should receive systematic free anti-syphilitic treament and future offspring will frequently be healthy.

It is important that congenital syphilitics should be regularly treated by mercury, as it is well recognized that the effects of hereditary syphilis are more severe than those of the acquired form, since they occur in organs and tissues in the process of development. The congenital form of the disease responds in a remarkable manner to the influence of mercury. A list of these children should be kept, and a health visitor should be appointed to visit them regularly and see that the parents bring them to the dispensary for systematic treatment.

Arseno-benzol should be used more frequently in cases of primary and secondary syphilis owing to its ability to rapidly sterilize cutaneous lesions and so make infected individuals less liable to spread the disease. This can easily enough be done at the district dispensaries in the same manner as is proposed for the dispensary treatment of yaws. It would be necessary to impress on these cases the necessity of receiving mercurial treatment as well for a period of at least eighteen months, since, unfortunately, arseno-benzol does not have the same specific action in the case of syphilis that it appears to have in yaws.

A large number of infected individuals have no sense of responsibility, and would probably cease treatment when the immediate symptoms have disappeared, only to turn up later for treatment when their symptoms have recurred, probably in an aggravated form. It would not be practicable, however desirable, to detain these people until they are free from infection. A start, however, might be made on the compulsory treatment of syphilitic prisoners in gaol, if the authorities have power to give compulsory injections of arseno-benzol and mercury, and, if there happened to be any syphilitic prisoners with a fairly long sentence, it should be possible, with intensive treatment, to have them free from infection on their discharge.

One hundred and eighty-seven surgical operations were performed in hospital during the year. Of

RETURN OF DISEASES AND DEATHS IN 1916-17 IN THE VICTORIA, SOUFRIERE AND YAWS HOSPITALS, AND IN THE PAUPER AND TOC LUNATIC ASYLUMS.

Saint Lucia.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	1	—	1
Anæmia	1	—	1
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	5	1	6
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	1	1	3
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	12	3	13
Enteric Fever	11	6	13
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	48	—	50
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	—	—	—
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	7	1	13
(*b*) Anæsthetic	—	—	—
(*c*) Mixed	—	—	—
Malarial Fever—	416	—	416
(*a*) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	176	7	181
(*b*) Remittent	—	—	—
(*c*) Pernicious	—	—	—
(*d*) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	6	—	6
Malignant	6	—	6
Old Age	—	—	—
Other Diseases	26	12	68
Pellagra	8	3	10
Plague	—	—	—
Pyæmia	1	—	1
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	14	—	15
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	—	—	—
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(*a*) Primary	1	—	1
(*b*) Secondary	41	1	42
(*c*) Tertiary	25	3	29
(*d*) Congenital	3	2	3
Tetanus	2	1	2
Trypanosoma Fever	—	—	—
Tubercle—	9	6	10
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—

	Admissions	Deaths	Total Cases Treated
GENERAL DISEASES—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping Cough	—	—	—
Yaws	282	—	295
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	112	4	119
Circulatory System	6	2	9
(*a*) Valvular Disease of Heart	19	5	20
(*b*) Other Diseases	—	—	—
Digestive System—	—	—	—
(*a*) Diarrhœa	—	—	—
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	—	—	—
Congestion of Liver	—	—	—
(*d*) Abscess of Liver	—	—	—
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	—	—	—
(*g*) Cirrhosis of Liver	3	1	3
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	31	1	33
Ear	1	—	1
Eye	8	—	23
Generative System—	—	—	—
Male Organs	102	1	107
Female Organs	24	—	26
Lymphatic System	30	2	30
Mental Diseases	24	7	91
Nervous System	22	4	28
Nose	1	—	1
Organs of Locomotion	9	3	9
Respiratory System	42	10	43
Skin—	1	—	1
(*a*) Scabies	—	—	—
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	—	—	—
(*f*) Other Diseases	—	—	—
Urinary System	33	4	36
Injuries, General, Local—	56	4	69
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(*c*) Other Injuries	—	—	—
Parasites—	—	—	—
Ascaris lumbricoides	3	—	3
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	24	3	25
Filaria medinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	1	—	1
Surgical Operations—	185	3	162
Amputations, Major	—	—	—
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	2	—	2

this total 164 were cured, twenty improved, and three died. Two of the three patients who died were almost moribund at the time of operation, but it was decided to give them their only chance.

An unusual case was that of a child who was sent in by Dr. Hughes as suffering from appendicitis. This diagnosis was concurred in by me and the child operated on. The appendix was found to be normal, but a very tightly packed mass of round worms was found in the lower 8 in. of the small intestine. The wound was closed, and the child later treated with anthelmintics. She made an uninterrupted recovery, and during the month following operation evacuated 212 large round worms.

ALAN KIDD, M.D., B.Ch.,
House Surgeon.

REPORT OF THE MEDICAL OFFICER OF THE FIRST DISTRICT.

CASTRIES.

The principal diseases treated were malaria, intestinal parasites, venereal diseases, and diseases of the digestive and respiratory systems.

A large number of cases of malarial fever were seen, but they were, as a rule, of a mild type, and the mortality was small. Disorders of the digestive system due to improper feeding continued to be much too common among young children. If there were more trained nurses and midwives throughout the island, who would be able to advise mothers as to the care of their children, *and to see that their advice was carried out*, there would undoubtedly be a great decrease in the number of these cases, and this is much to be desired. "Colds" and bronchitis were very prevalent during the last four months of the year. 137 cases of "intestinal parasites" were treated at the Gros-Islet Dispensary. This number, however, does not include all the cases treated there, as many more who were suffering from other complaints were also treated for worms.

In October six cases of what was apparently fish-poisoning were brought to the Gros-Islet Dispensary. All the patients belonged to the same family. The history was that a few days previously they had all partaken of some shell fish, and soon after were attacked with vomiting, diarrhœa, and abdominal pains. When I saw them the acute symptoms had passed off, but they were all suffering from a mild form of peripheral neuritis, from which they ultimately recovered.

Latrines have been erected at Gros-Islet for the use of the schools, but they have not yet been put to use.

DIGBY MACPHAIL, M.B., C.M.

REPORT OF THE MEDICAL OFFICER OF THE SECOND DISTRICT.

CASTRIES.

The prevailing diseases were malaria and venereal disease. A few cases of phthisis were seen and one or two of pellagra. The malaria was seldom severe in type, and pellagra seems to be stationary.

The question is that of venereal disease, which in this quarter of the colony is undoubtedly increasing considerably. One factor, which has not before been operative, is the presence of local troops undergoing training, who furnish a very large number of cases and doubtless spread it considerably. Castries quarter has always enjoyed the reputation of having more venereal than any other quarter of the Colony, and the examinations of recruits for the West Indies Overseas Contingent proved it. The number of rejections for venereal disease of men from the country districts, as compared with that of Castries men, was insignificant. Unfortunately a number of these countrymen have acquired syphilis during their training, have been discharged for that reason, and have returned to their homes while still infective, so it may safely be predicted that their presence in the out districts will soon be manifested by an increase of disease, and the Overseas Contingent must eventually prove to be a costly business to the colony. In a more highly educated community than this the effects might perhaps have been mitigated by impressing upon these discharged men the gravity of their condition and its danger to others, but experience shows (I believe the whole local medical staff will agree) the utter hopelessness of the attempt to impress upon the native the relationship of the different stages of syphilis, and the impossibility of inducing him to return indefinitely for treatment when he is feeling perfectly well. The indifference shown to such disease is also discouraging. Gonorrhœa is generally regarded as a complaint which, like measles, must be gone through, and a chancre as an unlucky incident which might happen to anybody and is nothing to be ashamed of. This may, of course, be due in some instances to the fact that cause and effect are not properly connected in the popular mind, but not in all. The venereal problem shows to my mind no possibility of being solved until education has reached a level which is not at present in sight.

The more one sees of pellagra, the more certain does it seem that it is purely a dietetic disease. Unfortunately—but naturally if this hypothesis is correct—the incidence is mostly upon the very poor who cannot alter their diet, more unfortunately still the diets of local institutions afford little variety in themselves or from what patients are accustomed to, so there is little tendency to improvement of pellagra cases in hospital, asylum, or gaol; in fact, I am quite satisfied that repeated long sentences cause the disease in habitual criminals. During the past year I was fortunate in encountering a case where it was possible to carry out dietetic treatment, on the lines suggested by Goldberger, with most encouraging results.

Zymotic disease was scarce; I do not remember a year in which one saw less measles, and while other districts suffered somewhat from typhoid, this remained practically free.

ALEX. KING, M.B., Ch.B., D.P.H.